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**National Highway  
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Washington, D.C. 20590

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ACCIDENT RESEARCH GROUP**

Division of Arvin/Calspan  
Buffalo, New York 14225

**CALSPAN ON-SITE AIR BAG DEPLOYMENT INVESTIGATION**

**CALSPAN CASE NO. 91-3**

**VEHICLE - 1990 GEO STORM GSi  
LOCATION [REDACTED], LOUISIANA  
ACCIDENT DATE - [REDACTED] 1990**

Contract No. DTNH22-93-P-07222

Prepared for:

U.S. Department of Transportation  
National Highway Traffic Safety Administration  
Washington, D.C. 20590



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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

# **TECHNICAL REPORT STANDARD TITLE PAGE**

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15. Supplementary Notes On-site investigation of an air bag deployment crash that involved a 1990 Geo Storm GSi. The unrestrained female driver sustained fatal injuries from her contact with the right door pull handle and armrest.					
16. Abstract <p>This report focuses on a single vehicle air bag deployment crash that involved a 1990 Geo Storm GSi. The crash occurred on a wet two lane state route in [REDACTED] on [REDACTED] 1990 at [REDACTED] hours. The 42 year old female driver lost control of the vehicle as she approached a bridge. The vehicle yawed in a counterclockwise (CCW) direction and initially contacted a barrier curb with the right rear wheel. The vehicle continued to yaw CCW across the roadway and impacted a w-beam guardrail system that paralleled the left side of the roadway. The vehicle's initial contact with the guardrail involved the front left bumper area; however, the full frontal area of the Geo engaged with the guardrail as it continued to rotate CCW. As a result of the guardrail impact, the vehicle underwent a sufficient longitudinal deceleration which deployed the driver air bag system. The Geo separated from the guardrail leading with the rear of the vehicle, rotating CCW. The vehicle traveled down an earth embankment and came to rest straddling a drainage ditch facing toward the roadway. As the vehicle came to rest, it had rotated approximately 270° CCW from its initial pre-crash trajectory.</p> <p>The female driver of the vehicle was 154.9 cm (61") and 41-45 kg (90-100 lbs.). Her seat and seatback was adjusted to the full forward position. She was not wearing the active 3-point lap and shoulder belt system. At impact, she was probably slightly out of position to her right due to the pre-crash CCW rotation of the vehicle. As the air bag deployed, the peripheral surface of the bag contacted her left facial area. The occupant continued to move laterally to her right in response to the guardrail impact. Her facial area impacted the right door pull handle which resulted in fractures of the nasal bones, frontal sinus, and right orbit. The contact arrested the movement of her head as her body continued laterally, thus loading her neck area. As a result of the neck loading, her head hyperextended which resulted in a hinge fracture of the skull, a fractured cervical disc, and compression of the spinal cord. The driver's right anterior neck and upper chest area subsequently contacted the right door armrest, resulting in a rectangular contusion of the neck and a right upper lobe pulmonary contusion.</p>					
17. Key Words Pre-crash CCW yaw Frontal impact sequence Out of position driver Air bag deployment Nasal bone displacement			18. Distribution Statement General Public		
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# **CALSPAN ON-SITE AIR BAG DEPLOYMENT INVESTIGATION**

**CALSPAN CASE NO. 91-3**

**VEHICLE - 1990 GEO STORM GSi**

**LOCATION - [REDACTED]**

## **SUMMARY**

This crash occurred on a bridge of a two lane state route in [REDACTED] on [REDACTED] 1990, at [REDACTED] hours. At the time of the crash, the lighting conditions were described as dusk and the weather was overcast with heavy rain. The involved vehicle was a 1990 Geo Storm GSi (VIN: [REDACTED]) that was equipped with a supplemental driver's air bag system. The vehicle was operated by a 42 year old female driver, 154.9 cm (61") in height with an estimated weight of 40.5 -45 kg (90-100 lbs.).

The Geo Storm was traveling in a westerly direction on the state route at a police reported speed of approximately 72 KPH (45 mph) with its headlights and windshield wipers in the "on" position. The posted speed limit for the area was 88 KPH (55 mph). On her approach to the accident scene, the driver negotiated a slight left curve with a downgrade and crossed a similar bridge located approximately 60 m (several hundred feet) east of the accident involved bridge. The asphalt road surface between the two bridges was straight with a slight downgrade of approximately 1.5% with an estimated coefficient of friction of .5-.6. As the Geo Storm approached the second bridge, the right side tires possibly overrode a puddle of standing water. There was a depression in the pavement that measured 3.2 m (10'6") in length and was .4-1.7m (1'4"-5'5") inboard of the north edgeline of the roadway with an approximate maximum depth of 7.6cm (3"). (The depression was partially filled with a patching compound several days following the crash.) The standing water could have caused the vehicle to yaw slightly in a clockwise direction as the right side tires overrode the water. The driver probably applied a counterclockwise (CCW) steering input in an attempt to maintain lateral stability of the vehicle.

The Geo Storm broke traction on the wet road surface and initiated a CCW yaw. The right rear tire and wheel impacted the right (north) curb as the tire was rotating, resulting in abrasions to nearly the entire circumference of the aluminum wheel. The wheel also impacted the curb with sufficient force to bend the rear toe adjustment arm that was located rearward of the axle center. The arm deformation resulted in a steer angle of +10° (leading edge of wheel assembly was toed outward) to the right rear wheel. Two possible areas of contact with the curb were noted (polishing and gouging of the curb face); however, due to the two month time interval between the date of the crash and scene inspection, it was impossible to determine the exact contact area.

The Geo Storm continued to yaw in a CCW direction as it crossed the eastbound travel lane. The left front corner area of the vehicle initially impacted a W-beam guardrail that was located 1.2 m (4') outboard of the south edgeline. The full frontal area of the vehicle engaged with the guardrail as it continued to rotate in a CCW direction. The vehicle sustained 5.8 cm (2.3") of maximum crush located at the left corner of the bumper reinforcement bar. The bumper energy absorbing devices (EADs) compressed 4.8 cm (1.9") on the left and 3.6 cm (1.4") on the right.

## **SUMMARY (CONT'D.)**

Both units returned to the original pre-crash positions. Crush values at bumper level were as follows:  $C_1 = 5.8\text{cm}$  (2.3"),  $C_2 = 5.6\text{cm}$  (2.2"),  $C_3 = 5.3\text{ cm}$  (2.1"),  $C_4 = 5.3\text{cm}$  (2.1"),  $C_5 = 2.8\text{cm}$  (1.1"),  $C_6 = 1.0\text{cm}$  (0.4"). As a result of the guardrail impact, the vehicle underwent a sufficient longitudinal deceleration which deployed the driver air bag system. The vehicle sustained an impact force that traveled through the 1-3 o'clock sectors as it rotated in a CCW direction while remaining engaged with the guardrail system.

Direct contact damage (i.e., paint transfers, scratching) on the W-beam guardrail was 2.9 m (9'5") in length. The overall deformed length of guardrail spanned 7.3 m (23'11") with a maximum crush value of 15.2 cm (6"). The impact also displaced three of the 20 x 20 cm (8" x 8") wood guardrail posts to a maximum displacement of 7.0 cm (2.75").

The Geo Storm separated from the guardrail leading with the rear of the vehicle as its center of gravity continued to travel in a westerly direction. The vehicle continued to rotate in a CCW direction as it traveled past the struck guardrail system before backing down a grassy embankment. The Geo Storm came to rest straddling a drainage ditch 25 m (82') west of its separation point from the guardrail and 11.3 m (37') south of the south road edgeline. At rest the vehicle was facing in a northerly direction and had rotated approximately 270° CCW of its initial pre-crash trajectory.

The driver was not wearing the manual 3-point lap and shoulder belt system. The belt webbing was found (at the time of [REDACTED] inspection) neatly stowed and fully retracted against the left B-pillar. The latchplate was adjusted to a point on the belt webbing that could not reach the buckle assembly when extended around the full forward positioned driver's seat. There was no evidence of occupant loading on the belt webbing or loading transfers from the B-pillar mounted D-ring. The EMT/coroner who removed the body from the vehicle stated that the belt system was not in use.

The driver's seat and seat back were adjusted to the full forward position. The driver was probably slightly out of position to her right at impact with the guardrail due to the pre-crash CCW rotation of the vehicle. At impact, the air bag deployed when the bottom of the steering wheel (6 o'clock position) was rotated to the 1:30 - 2:00 o'clock position. The peripheral surface of the deployed air bag (seam area) contacted the left side of the driver's face as she initiated a forward and lateral trajectory to the right in response to the frontal impact sequence with the guardrail. Makeup transfers were visible on the peripheral surface of the air bag (at the seam) at the normal 6 o'clock position of the bag. No facial injuries occurred from the driver's involvement with the air bag.

The driver continued on her trajectory as the vehicle rotated out from under her in a CCW direction. The driver's face impacted the right door panel in the area of the vertical pull handle on a downward trajectory. The impact resulted in a fracture of the nasal bone (AIS-1), with displacement both up and to the left. The impact also fractured her frontal sinuses and right

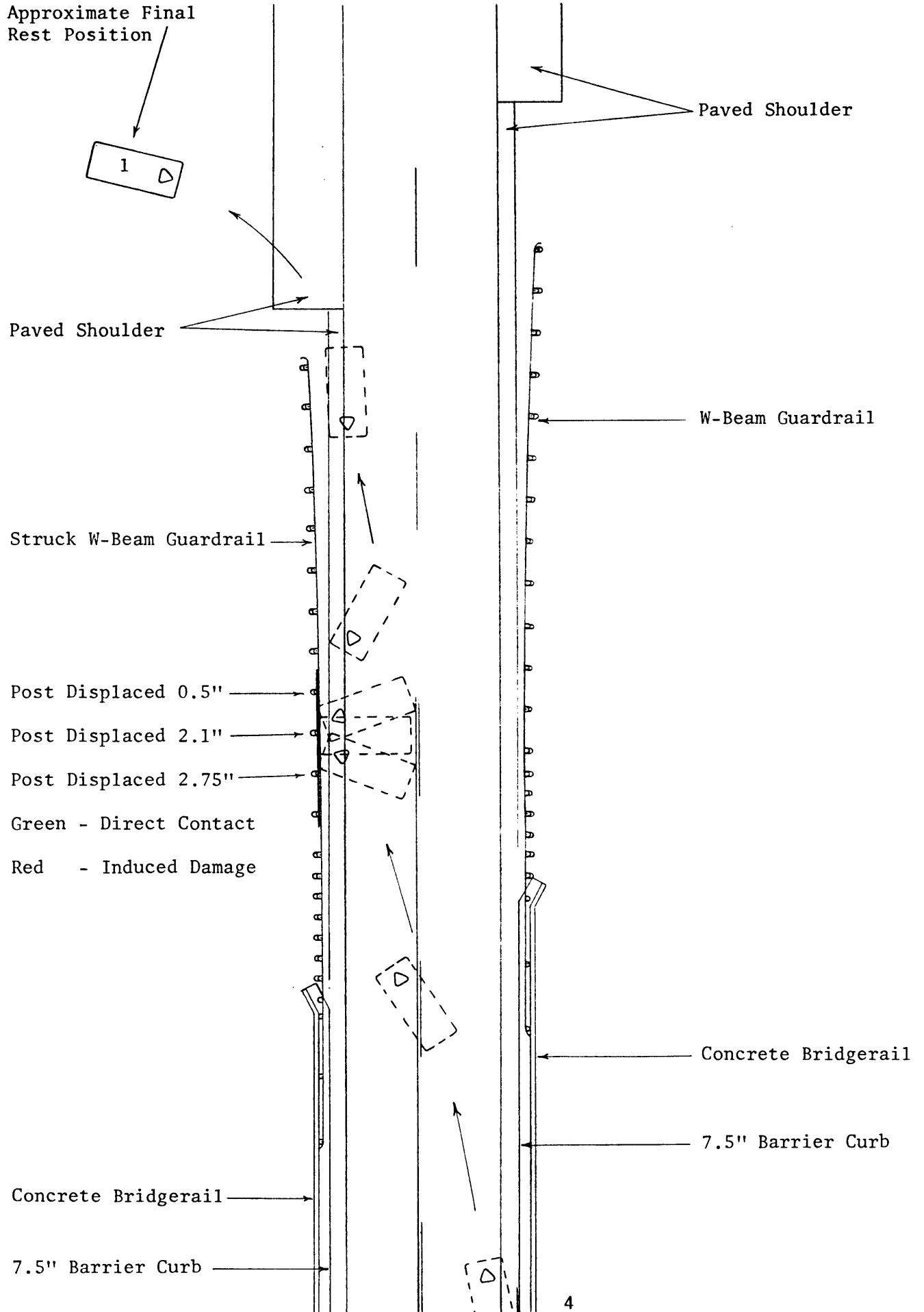
## **SUMMARY (CONT'D.)**

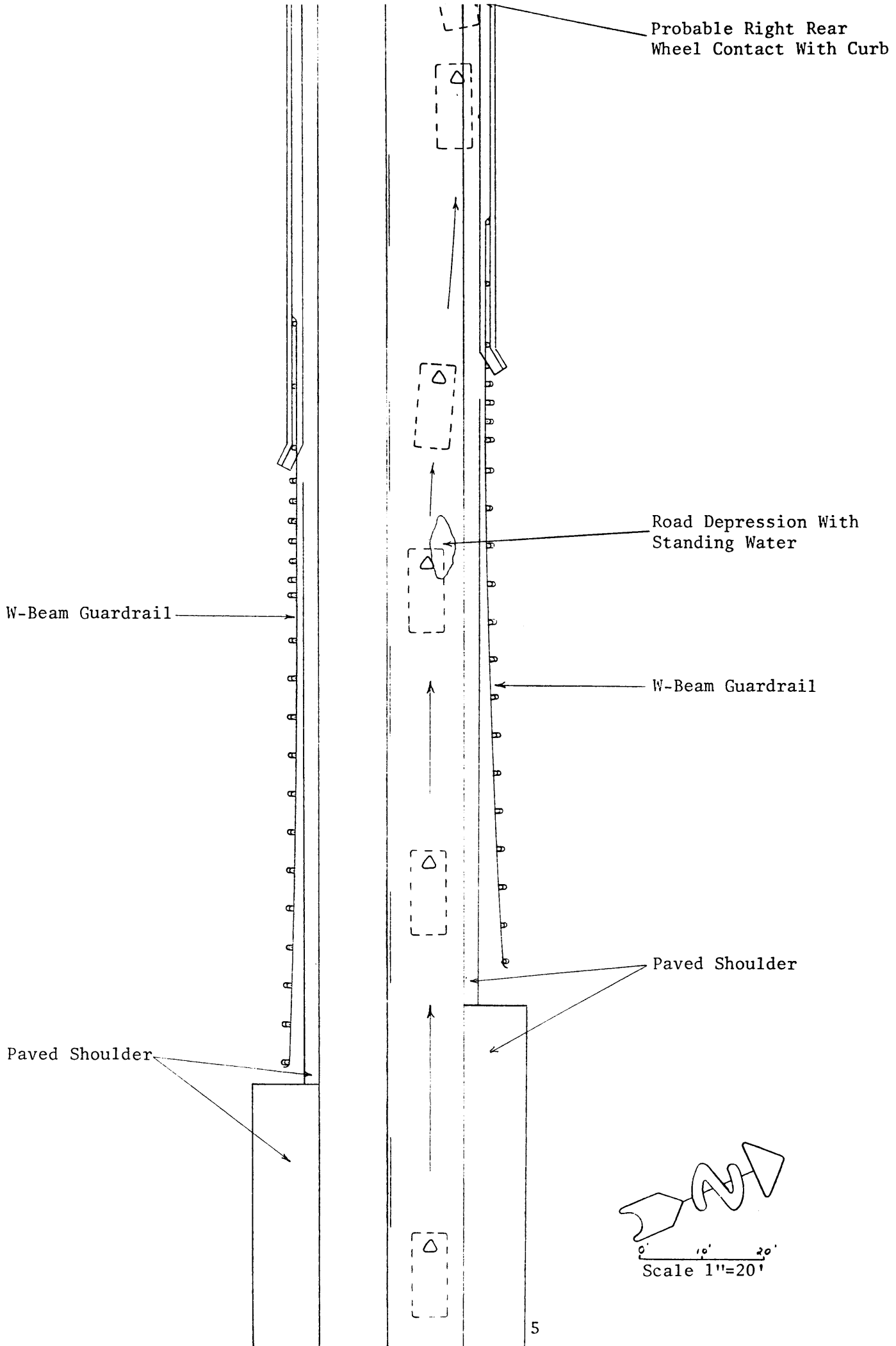
orbit (AIS-2). There was no damage or contact evidence on the pull handle. The contact arrested the movement of the occupant's head as her torso continued on its trajectory toward the right door. As a result, her head was rotated rearward (hyperextension) which fractured the disc between the C<sub>3</sub> and C<sub>4</sub> cervical vertebrae (AIS-2), and compressed the spinal cord (AIS-3). The hyperextension of the head exposed the driver's anterior neck to the right door armrest which resulted in a 8 cm x 6 cm rectangular contusion of the anterior neck and upper right chest (AIS-1). The armrest contact also contused the upper lobe of her right lung (AIS-3).

The hyperextension of the head and subsequent rearward movement of the brain within the skull resulted in a hinge fracture of the base of the skull (AIS-4) that extended from the right ear to the left through the petrous portion of the right temporal bone, swung a loop anteriorly through the right temporal fossa to the sella turcica, then proceeded to the left through the petrous portion of the left temporal bone and ended in the left ear. She also sustained subdural (AIS-4) and cerebral hemorrhage and cerebral edema (AIS-4).

The driver came to rest with her head resting on the right front seat cushion against the right door panel as she bled profusely from the ears, nose, and mouth. She expired immediately following the crash.

ACCIDENT SCHEMATIC  
CALSPAN CASE NO. 91-03







**CALSPAN ON-SITE AIR BAG DEPLOYMENT INVESTIGATION**  
**CALSPAN CASE NO. 91-3**  
**VEHICLE - 1990 GEO STORM GSi**  
**LOCATION - [REDACTED]**

**ACCIDENT DATA**

Location:	2 lane state route
City/Township:	[REDACTED] Louisiana
Area/Type:	Rural/Undeveloped
Accident Date/Time:	[REDACTED] 1990, [REDACTED] hours
Investigating Police Agency:	[REDACTED]
Accident Type:	Car/Guardrail, frontal impact sequence
Air Bag Vehicle Occupant Injury Severity:	Driver expired due to multiple AIS-4 level injuries

**AMBIENCE**

Viewing Conditions:	Dusk
Weather:	Cloudy
Precipitation:	Rain
Rate of Precipitation:	Moderate to heavy
Road Surface:	Wet with puddled water

**HIGHWAY**

Type:	State route
Number of Lanes:	2
Width:	6.9 m (22'9")
Surface:	Asphalt

## **HIGHWAY (CONT'D.)**

Median:	None
Edge:	North edge - 0.8 m (2'7") paved shoulder South edge - 0.7 m (2'5") paved shoulder
Vertical Alignment:	1.5% grade, negative to the west
Horizontal Alignment:	Straight
Estimated Coefficient of Friction:	.50-.60
Traffic Density:	Light

## **TRAFFIC CONTROLS**

Signals:	None
Signs:	55 MPH speed limit sign, shoulder narrowing warning signs
Markings:	Solid white edge lines, no passing centerlines for eastbound traffic
Speed Limit:	88 KPH (55 mph)

## **VEHICLE**

Description:	1990 Geo Storm GSi, 2 dr. hatchback
V.I.N.:	J81RT2359L7 (production number deleted)
Color:	Silver
Odometer:	7961 km (4,945 miles)
Engine:	4 cylinder, 1.6 liter
Transmission:	5-speed manual, console mounted transmission selector lever
Drive Wheels:	Front wheel drive
Steering:	Power-assisted rack and pinion

## **VEHICLE (CONT'D.)**

Brakes:	Power-assisted front disc/rear drum
Padding:	Upper and mid instrument panel, knee bolster, glove box door, soft edged steering wheel rim and air bag module cover, adjustable head restraints, sunvisors, upper door panel, door armrest
Manual Restraints:	3-point lap and shoulder belts in the four outboard seated positions
Automatic Restraints:	Supplemental Inflatable Restraint (SIR) driver's side air bag system which deployed as a result of the frontal impact sequence with the W-beam guardrail
Defects:	None
Tow Status:	Towed due to vehicle damage

## **VEHICLE DAMAGE**

Exterior:	<p>The 1990 Geo Storm was involved in two accident events that produced damage to the right side and frontal areas of the vehicle. The initial event involved right rear wheel contact with the 19 cm (7.5") barrier curb that paralleled the concrete bridge. The wheel impact occurred as the vehicle broke traction on the wet road surface and initiated a counterclockwise yaw. The wheel contacted the face of the curb which produced radial abrasions (superficial gouging) to the perimeter of the aluminum wheel and left scuffing to the sidewall of the P185/60R14 tire. The abrasions were distributed over 85 percent of the circumference of the wheel which indicated that the wheel was rotating at the time of contact with the curb.</p> <p>The curb impact occurred as the vehicle yawed approximately 10-15° in a counterclockwise direction, exposing the rear portion of the wheel (rearward of the axle position) to the curb. The impact force that resulted from the contact was primarily longitudinal (within the 12 o'clock sector); however, the lateral force component was sufficient to bend the rear toe adjustment arm. The toe adjustment arm was located rearward of the axle position and deformed at the threaded mid point of the arm. The post crash length of the damaged right side adjustment arm was 39 cm (15.375"), 15.1 mm (19/32") shorter than the undamaged left side toe adjustment arm. The bending of the arm resulted in 10° of toe-</p>
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Exterior  
(Cont'd.):

out to the right rear wheel.

The Geo Storm continued to yaw in a counterclockwise (CCW) direction as it crossed the travel lanes and impacted a W-beam guardrail that was located downstream (west) of the bridge and 1.2 m (4') outboard of the south road edgeline. The left corner area of the front bumper fascia initially impacted the guardrail. The full frontal area of the bumper fascia engaged with the guardrail as the vehicle's CCW rotation was accelerated by the frontal contact. Direct contact damage, which consisted of paint abrasions, measured 137.4 cm (54.1") and extended across the entire frontal width of the vehicle. Maximum crush was 5.8 cm (2.3"), located at the left corner of the bumper reinforcement bar. Crush values were measured at the reinforcement bar level and were as follows:  $C_1 = 5.8\text{cm (2.3")}$ ,  $C_2 = 5.6\text{cm (2.2")}$ ,  $C_3 = 5.3\text{cm (2.1")}$ ,  $C_4 = 5.3\text{cm (2.1")}$ ,  $C_5 = 2.8\text{cm (1.1")}$ ,  $C_6 = 1.0\text{ cm (0.4")}$ .

The impact fully compressed the left front bumper energy absorbing device (EAD) 4.8 cm (1.9") and buckled the frame rail. The right frame rail also buckled as the right EAD compressed 3.6 cm (1.4"). Both units returned to their original pre-crash positions as the vehicle separated from the struck guardrail.

Although the front bumper crush was minimal, the entire frontal structure of the vehicle absorbed the energy from the guardrail impact. The frame rail buckling resulted in rearward displacement of the front fenders. The rear portions of the front fenders were damaged by the leading edge of the doors as the doors were opened post-crash. Rescue personnel opened the right front door beyond its normal range during the extrication of the driver's body. The detent stop on the door separated from the right A-pillar and the hinges were deformed away from the pillar.

The left wheelbase was reduced in length by 0.6 cm (.25") while the right wheelbase was lengthened by 1.9 cm (.75").

CDC:  
(Ranked in order  
of highest  $\Delta V$ )

Event No.

Object Struck

2	02-FDEW-1
1	12-RBWN-1

W-beam guardrail
Concrete barrier curb

Repair Cost:

Unknown (estimated at \$4,500 - \$5,500)

**Interior:**

The interior of the Geo Storm sustained minor damage that was associated solely with occupant contact. There was no glazing damage or intrusion of interior components.

As the driver initiated her lateral trajectory to her right, her left face was contacted by the peripheral surface (rounded side surface) of the deploying air bag. Makeup transfers were noted at the 6 o'clock position of the air bag (bottom edge with steering wheel in a straight forward position). The largest transfer began at the seam and extended 4.8 cm (1.9") vertically toward the face of the air bag and measured 5.1 cm (2") horizontally. A second makeup transfer extended 1.9 cm (.75") right of the vertical centerline of the bag to 3.2 cm (1.25") left of the centerline. The faint transfer began at the seam and extended 2.5 cm (1") toward the back side of the air bag (away from driver). The transfers probably occurred as the bottom edge of the steering wheel was rotated to the 1:30-2 o'clock position.

The driver's right knee or lower leg probably contacted the left side panel of the center console, producing a superficial scuff mark to the plastic component. The 2.5 x 3.2 cm (1 x 1.25") diagonally orientated scuff mark was centered 12.1 cm (4.75") above the bottom edge of the console and 14.2 cm (5.6") rearward of the forward edge of the side panel. The driver continued to move laterally across the interior of the vehicle and impacted her right facial area on the vertical pull handle of the right door panel. The pull handle was an integral component of the right door armrest which was attached to the door structure by 3 mounting screws. The driver's contact with the pull handle did not damage or deform the rigid component. Contact evidence consisted of body fluid transfers on the vinyl covered pull handle.

The driver's right anterior neck subsequently contacted the right door armrest depositing a probable tissue transfer that was located 70.5-74.7 cm (27.75-29.4") rearward of the leading edge of the door and 27.3 cm (10.75") below the top surface of the door sill. The tissue transfer was located on the radius of the horizontal and vertical surface of the armrest extending 2.5 cm (1") horizontally and 1 cm (.4") vertically. The contact point was whitish in color and under magnification (8X), contained small curled fragments of what appeared to be tissue.

Following the driver's contact sequence with the right door pull handle and armrest, the driver bled profusely from the ears, nose, and mouth as she came to rest across the interior of the vehicle. Dried blood spatters were noted to the fabric portion of the right door panel immediately above the armrest and at the apex of the pull handle/armrest juncture. The driver came to rest with her

Interior  
(Cont'd.)

head resting on the right front seat cushion against the door panel. A large amount of dried blood was also in the map pocket located in the lower portion of the right door panel. Large amounts of dried blood were also on the center and right side of the right front seat cushion. Two isolated blood spatters were also noted by the investigating police officer on the left head restraint and on the steering column.

The left sunvisor had a shallow, longitudinally orientated depression that was centered on the Supplemental Inflatable Restraint label that was affixed to the visor. The deformity was approximately 3.8 cm (1.5") in width and extended approximately 10.2 cm (4") fore and aft. Although not believed to be occupant related, it was possible that the driver's left arm separated from the steering wheel due to her trajectory and contact with the deploying air bag and impacted the visor. There was no injury to the arm to support this contact sequence.

### AIR BAG SYSTEM

The Geo Storm was equipped with a Supplemental Inflatable Restraint (SIR) system that consisted of a driver's side air bag that deployed as a result of the guardrail impact. The SIR system consisted of a front mounted discriminating (crash) sensor, an arming (safing) sensor, a diagnostic energy reserve module (DERM), and the steering wheel mounted air bag module. A representative from [REDACTED] stated that the air bag was manufactured by [REDACTED] and that the inflator was manufactured by [REDACTED]

The air bag was constructed of a nylon type woven fabric with a neoprene internal liner. The bag measured approximately 63.5 cm (25") in diameter and was vented by two 4.4 cm (1.75") diameter ports located on the back side of the bag at the 10 and 2 o'clock positions. The air bag was tethered by six internal straps that were sewn to the center inner face of the bag with three rows of orange stitching. The tether attachment points formed a 19.4 cm (7.6") diameter reinforcement to the center of the bag. There was no damage to the bag; however, there were makeup transfers located at the 6 o'clock position of the peripheral surface of the bag. The most notable transfer was 5 x 4.8 cm (2 x 1.9") which began at the seam and extended upward toward the face of the bag. A faint transfer extended to the left of the above transfer and onto the back side of the bag, away from the driver. This transfer began 1.9 cm (0.75") right of the vertical centerline and continued 4.4 cm (1.75"), to the left. The air bag was identified by the following numbers stamped on the back surface:

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

## **AIR BAG SYSTEM (CONT'D.)**

The air bag module cover opened in a typical H-configuration at the designated tear points. The upper flap measured 16.5 cm (6.5") horizontally x 7.6 cm (3"). The lower flap was tapered horizontally from 16.5 cm to 14.6 cm (5.75") and was approximately 6.3 cm (2.5") vertically. There was no damage or contact evidence to the module cover flaps.

██████████ representatives performed a diagnostic test on the DERM. There were no faults recorded by the system. The DERM readout, which is included as Appendix D of this report, indicated that the arming sensor initially closed during the crash sequence. The discriminating sensor closed 91.6 milliseconds after the arming sensor and as a result, the SIR deployed.

## **COLLISION SEQUENCE**

### **Pre-Crash:**

The Geo Storm was traveling in a westerly direction on the state route at a police reported speed of approximately 72 KPH (45 mph) with its headlights and windshield wipers in the "on" position. The posted speed limit for the area was 88 KPH (55 mph). On her approach to the accident scene, the driver negotiated a slight left curve with a downgrade and crossed a similar bridge located approximately 60 m (several hundred feet) east of the accident involved bridge. The asphalt road surface between the two bridges was straight with a slight downgrade of approximately 1.5% with an estimated coefficient of friction of .5-.6. As the Geo Storm approached the second bridge, the right side tires possibly overrode a puddle of standing water. There was a depression in the pavement that measured 3.2 m (10'6") in length and was .4-1.7m (1'4"-5'5") inboard of the north edgeline of the roadway with an approximate maximum depth of 7.6 cm (3"). (The depression was partially filled with a patching compound several days following the crash.) The standing water could have caused the vehicle to yaw slightly in a clockwise direction as the right side tires overrode the water. The driver probably applied a counterclockwise (CCW) steering input in an attempt to maintain lateral stability of the vehicle.

### **Crash:**

The Geo Storm broke traction on the wet road surface and initiated a CCW yaw. The right rear tire and wheel impacted the right (north) curb as the tire was rotating, resulting in radial abrasions to the entire circumference of the aluminum wheel. The wheel also impacted the curb with sufficient force to bend the rear toe adjustment arm that was located rearward of the axle center. The arm deformation resulted in a steer angle of +10° (leading edge of wheel assembly was toed outward) to the right rear wheel. Two possible areas of contact with the curb were noted (polishing and gouging of the curb face); however, due to the two month time interval between the date of the crash and scene inspection, it was impossible to determine the exact contact area.

Crash  
(Cont'd.)

The Geo Storm continued to yaw in a CCW direction as it crossed the eastbound travel lane. The left front corner area of the vehicle initially impacted a W-beam guardrail that was located 1.2 m (4') outboard of the south edgeline. The full frontal area of the vehicle engaged with the guardrail as it continued to rotate in a CCW direction. The vehicle sustained 5.8 cm (2.3") of maximum crush located at the left corner of the bumper reinforcement bar. The bumper energy absorbing devices (EADs) compressed 4.8 cm (1.9") on the left and 3.6 cm (1.4") on the right. Both units returned to the original pre-crash positions. Crush values at bumper level were as follows:  $C_1 = 5.8\text{cm (2.3")}$ ,  $C_2 = 5.6\text{cm (2.2")}$ ,  $C_3 = 5.3\text{cm (2.1")}$ ,  $C_4 = 5.3\text{cm (2.1")}$ ,  $C_5 = 2.8\text{cm (1.1")}$ ,  $C_6 = 1.0\text{cm (0.4")}$ . As a result of the guardrail impact, the vehicle underwent a sufficient longitudinal deceleration which deployed the driver air bag system. The vehicle sustained an impact force that traveled through the 1-3 o'clock sectors as it rotated in a CCW direction while remaining engaged with the guardrail system.

The struck guardrail system began 7.5 m (24'5") east of the southwest end of the concrete bridgerail (reference point). A flared section of guardrail was attached to the bridge with 15 x 30 cm (6 x 12") wooden blocks between the W-beam and the bridgerail. As the W-beam guardrail extended west of the bridge, it was attached to a series of strong wooden posts, with 20 x 20 cm (8" x 8") blocks between the rail and the posts. The first seven posts west of the bridge were spaced on 0.9 m (3'2") centers. The remaining twelve posts were of the same construction; however, their spacing was increased to 1.9 m (6'3") centers.

The Geo Storm impacted the W-beam guardrail at a point that was 10.2 m (33'7") west of the southwest edge of the bridge. The direct contact damage (paint transfers) extended 2.9 m (9'5") west, extending 13.1 m (43') west of the referenced bridge rail. The induced damage (overall deformation to the beam) from the impact sequence spanned a 7.3 m (23'11") area of the guardrail. The damage began 7.5m (24'8") west of the bridgerail and ended 14.8 m (48'7") west. Maximum crush (lateral displacement) to the W-beam was 15.2 cm (6") measured at the lower corrugation and was located 11 m (36') west of the bridge end. Crush values measured at six equal intervals along the induced damage length of rail were as follows:  $C_1 = 0\text{ cm (bridge end)}$ ,  $C_2 = 4.1\text{ cm (1.6")}$ ,  $C_3 = 12.7\text{ cm (5.0")}$ ,  $C_4 = 10.8\text{ cm (4.25")}$ ,  $C_5 = 3.8\text{ cm (1.5")}$ ,  $C_6 = 0\text{ cm}$ .

The Geo Storm separated from the guardrail leading with the rear of the vehicle as its center of gravity continued to travel in a



Crash  
(Cont'd.):

westerly direction. The vehicle continued to rotate in a CCW direction as it traveled past the struck guardrail system before backing down a grassy embankment. The Geo Storm came to rest straddling a drainage ditch, 25 m (82') west of its separation point from the guardrail and 11.3 m (37') south of the south road edgeline. At rest the vehicle was facing in a northerly direction and had rotated approximately 270° CCW of its initial pre-crash trajectory.

Post-Crash:

Final Rest -

The Geo Storm came to rest straddling a drainage ditch with the rear bumper facia in contact with the south embankment of the ditch. Although no residual damage occurred, mud was embedded into the facia and the exhaust tailpipe. At rest, the vehicle was approximately perpendicular to the road facing in a northerly direction.

Witness  
Activities -

A truck driver was proceeding in an easterly direction on a long downgrade to the crash scene. He observed the vehicle as it spun out of control, impacted the guardrail, and rolled to rest off-road. The truck driver stopped his vehicle on the south shoulder and approached the Geo Storm with another witness who was traveling behind his truck. The witnesses stated that the engine was running and that the vehicle's headlights, windshield wipers, and radio were in the "on" position. Both witnesses observed the driver of the Geo Storm slumped over the right front seat cushion. The truck driver opened the driver's side door and detected a foul odor that he later associated with the deployed air bag. He pushed the deflated air bag to the side and turned off the ignition and headlight switch. The truck driver ran back to his truck and used his radio to notify the police and requested ambulance assistance.

Police  
Activities -

The [REDACTED] received notification of the crash and arrived on-scene approximately eighteen minutes after the call. He was met at the scene by the [REDACTED], who also served as the [REDACTED]. The [REDACTED] was unable to detect a pulse and pronounced the driver dead at the scene.

Rescue  
Activities -

The [REDACTED] stated that the body was lying in a face-down orientation on the right front seat cushion with the head at the seat cushion/seat back juncture. The abdominal area was across the console of the vehicle and the buttocks were on the left front seat cushion. He stated that the driver was not wearing the manual seat belt system.

Rescue Activities  
(Cont'd.):

The [REDACTED] removed the body from the vehicle through the right front door. As he lifted the body off the seat cushion, he noted a pair of eyeglasses lying in a pool of blood on the right front seat cushion. He further stated that the glasses were not damaged.

Both the [REDACTED] and the investigating officer noted a large amount of blood on the right front seat cushion, right door, and the rear floor area. The officer determined that the crash was of minor severity due to the minimal damage to the front of the vehicle. He suspected that the driver possibly expired from a gun shot wound to the head and ordered the body transported to a [REDACTED] hospital for X-rays of foreign objects and/or entry wounds. No alternative injury mechanisms were found. The body was subsequently transported to the morgue for an autopsy.

Scene  
Clearance -

Following the on-scene police investigation, the Geo Storm was towed from the accident scene.

**HUMAN FACTORS/OCCUPANT DATA**

Driver:	42 year old female
Height:	154.9 cm (61")
Weight:	40.5 - 45 kg (90 - 100 lbs.), medical examiner estimate
Adjusted Seat Position:	Fully forward
Manual Restraint System Usage:	None, 3-point lap and shoulder belt was available
Usage Source:	Vehicle inspection, occupant contact points and final rest position of driver
Eyewear:	Prescription eyeglasses, plastic front frames and lenses, metal side frames. Glasses separated from driver's face during crash and were not damaged.
Vehicle Familiarity:	1 year
Route Familiarity:	Daily
Trip Plan:	En route to residence from work

## HUMAN FACTORS/OCCUPANT DATA (CONT'D.)

Type of Medical Treatment: None; fatal at scene. Body was transported to a [REDACTED] hospital for head X-rays at the request of the [REDACTED] and the [REDACTED] police.

## DRIVER INJURIES

<u>Injury</u>	<u>Severity (OIC/AIS)</u>	<u>Probable Injury Source</u>
Large hinge fracture which started in the right ear, proceeded to the left through the petrous portion of the right temporal bone, swung a loop anteriorly through the right temporal fossa to the sella turcica, then proceeded to the left through the petrous portion of the left temporal bone, ending in the left ear	Severe (HIFS-4)	Hyperextension of head that resulted from facial contact with the right door pull handle
Cerebral edema with swelling of the hemispheres and closure of the ventricles	Severe (HIUB-4)	Hyperextension of head that resulted from facial contact with the right door pull handle
Subdural hemorrhage (15-20 cc) of the posterior fossa	Severe (HPUB-4)	Hyperextension of head that resulted from facial contact with the right door pull handle
Contusions of the undersurface of the right cerebellar hemisphere	Serious (HICB-3)	Hyperextension of head that resulted from facial contact with the right door pull handle
Diffuse subarachnoid hemorrhage over both parietal and occipital cortices		Result of head injury
Subarachnoid hemorrhage of the superior and inferior surfaces of the cerebellum		Result of head injury

### **DRIVER INJURIES (CONT'D.)**

Fracture through the disc between C <sub>3</sub> and C <sub>4</sub>	Moderate (NPFS-2)	Hyperextension of head that resulted from facial contact with the right door pull handle
Compression of the spinal cord	Serious (NPCC-3)	Hyperextension of head that resulted from facial contact with the right door pull handle
Large contusion of the lateral aspect of the upper lobe of the right lung	Serious (CRCP-3)	Right door armrest
Upper right chest contusion	Minor (CRCI-1)	Right door armrest
Fracture of the anterior wall of the right maxillary sinus	Moderate (FIFS-2)	Right door pull handle
Fracture of the right orbit	Moderate (FRFS-2)	Right door pull handle
Fractured nasal bones, nose deviated to left, blow upward to bottom of nose pushing bones into frontal sinus	Minor (FCFS-1)	Right door pull handle
Hemorrhage in both the frontal and ethmoidal sinuses	Result of facial fractures	Right door pull handle
Large contusion of the right neck, rectangular in shape, 6 x 8 cm	Minor (NACI-1)	Right door armrest

### **DRIVER KINEMATICS**

The driver of the Geo Storm was probably in a normal, upright seated position as she approached the accident scene. She was wearing a lightweight blue wool jacket with a large lapel type collar. Family members stated that she typically wore the jacket with the collar down and open. They also stated that she wore light foundation makeup with a light rouge on her cheeks and a light colored lipstick. The driver was wearing new prescription bifocal eyeglasses which she reportedly wore at all times. The driver's seat and seatback were adjusted to the full

## **DRIVER KINEMATICS (CONT'D.)**

forward position. The adjustment points were confirmed from observations by the investigating police officer, statements from family members, and from photographs of the seat that were taken on the day after the crash.

The driver was not wearing the manual 3-point lap and shoulder belt system. The belt was found at the time of our inspection fully retracted against the B-pillar. The belt webbing and the latchplate did not exhibit evidence of loading. The latchplate was equipped with a cinch bar and was adjusted to a point on the belt webbing that was 64.8 cm (25.5") above the floor mounted anchor point, or 8.3 cm (3.25") below the D-ring. With the seat adjusted to the forward position, the found position of the latchplate would not permit buckling of the system when the belt was extended in a normal position around the seat. The EMT who removed the body from the vehicle stated that the belt system was not in use at the scene and that no one reported unbuckling the system.

As the vehicle rotated in a counterclockwise direction across the travel lanes, the driver was probably displaced slightly out of position to her right. At impact with the guardrail, the driver's upper body was probably to the right of the steering wheel as the SIR system deployed. The steering wheel was also rotated (direction was unknown) to a point where the normal 6 o'clock position was an approximate 2 o'clock position. The peripheral surface of the deploying air bag contacted the left side of the driver's face as she responded to the initial 1 o'clock impact force. Although no injury occurred, makeup transfers were noted to the peripheral surface of the bag at the (normal) 6 o'clock position.

The driver continued to move toward the initial 1 o'clock impact; however, as the vehicle continued to rotate CCW, she became exposed to the right door as the vehicle rotated out from under her. The driver's pelvic area contacted the center console which induced a downward component to her lateral trajectory. Her face impacted the diagonally orientated right door pull handle which resulted in a fracture of the nasal bone with displacement both up and to the left, fractures of the right orbit and of the frontal, ethmoidal, and right maxillary sinuses. The door pull handle was approximately 3.8 cm (1.5"), in width and was constructed of a rigid material covered in vinyl. There was no damage to the pull handle or to its mounting points; however, body fluid was noted to the exposed surface of the handle.

The pull handle arrested the movement of the driver's head; however, her torso continued to respond to the impact force. As a result, the torso loaded the neck which rotated the head in a rearward direction (hyperextension). The rotation of the head fractured the disc between cervical vertebrae C3 and C4 and compressed the spinal cord. In addition to the hyperextension, the brain was displaced rearward within the skull which resulted in a large hinge fracture through the base of the skull that extended from ear to ear. There was also 15 - 20 cm of subdural hemorrhage over the posterior fossa, cerebral edema with swelling of the hemispheres and closure of the ventricles, contusions of the under surfaces of the right cerebellar hemisphere, and multiple subarachnoid hemorrhage.

The rotation of the head exposed the driver's right anterior neck and right upper chest to contact with the upper surface of the right door armrest. As a result of the contact, the driver sustained

### **DRIVER KINEMATICS (CONT'D.)**

a large 6 x 8 cm rectangular contusion of the right anterior neck, and upper right chest contusion, and a large contusion of the lateral aspect of the upper lobe of the right lung. Contact evidence on the right door armrest consisted of a probable tissue transfer that was located 70.5 - 74.7 cm (27.75 - 29.4") rearward of the leading edge of the door and 27.3 cm (10.75") below the top of the door panel. The transfer, when viewed through a 8X magnifying lens, consisted of whitish small curled fragments.

The driver rebounded slightly from the door contacts and came to rest in a face-down orientation on the right front seat cushion. She bled profusely from the ears, nose, and mouth and expired immediately following the crash.

## SLIDE INDEX

<u>Slide No(s).</u>	<u>Description</u>
1	Accident schematic
2	Driver injury mannequin
3-5	Pre-crash trajectory of the Geo Storm
6-7	Road depression
8	Vehicle initiates a probable CW to CCW yaw
9,10	Right rear wheel impacts curb
11,12	Vehicle rotates CCW across travel lanes
13,14	Frontal area of Geo Storm impacts W-beam guardrail
15,16	Direct contact damage on guardrail
17	Longitudinal view showing the extent of guardrail crush
18,19	Vehicle separates from guardrail, leading with rear of vehicle
20	Vehicle travels down embankment to final rest
21-23	Lookback views of vehicle's trajectory
24	Frontal view of the Geo Storm
25	Left front three-quarter view
26	Perpendicular views of the left frontal area showing the extent of crush
27	Left front bumper energy absorbing device
28	Left side view
29	Left rear three-quarter view
30	Rear view, mud on bumper facia, no residual damage

## **SLIDE INDEX (CONT'D.)**

<b><u>Slide No(s).</u></b>	<b><u>Description</u></b>
31	Right rear three-quarter view
32	Right front three-quarter view
33	Perpendicular views of the right frontal area showing the extent of crush
34,35	Right front bumper energy absorbing device
36	Center front air bag crush sensor
37	Right rear wheel curb impact damage
38	Toe-out of right rear wheel
39	Deformed toe adjustment arm for right rear wheel
40	Identification labeling on left B-pillar
41-43	Overall interior views from the left door area
44	Knee bolster, no evidence of occupant contact
45	Possible right leg scuff on center console panel
46,47	Deployed driver air bag
48,49	Makeup (rouge) transfers on the periphery of the deployed air bag at the 6 o'clock position
50,51	Venting ports and identification numbers on air bag
52	Upper air bag module flap
53	Lower air bag module flap
54,55	Perpendicular views of the module flap and their excursion into the driver's space



## **SLIDE INDEX (CONT'D.)**

<b><u>Slide No(s).</u></b>	<b><u>Description</u></b>
56,57	Perpendicular views of the forward position of the driver's seat and of her trajectory
58,59	Driver's trajectory toward the right door
60	Forward third of right front door and right A-pillar; no contact evidence
61	Facial contact to the right door pull handle
62	Faint reddish transfers (not blood) to upper surface of pull handle
63	Contacted pull handle and right door armrest
64,65	Probable tissue transfer on right door armrest from driver's anterior and right neck area
66	Longitudinal views of the right door panel, no deformation
67	Right door panel removed
68	Back side of door panel
69	Inner door skin
70	Perpendicular view across the interior from the right door area
71	Final rest area of the driver's head and eyeglasses
72,73	Driver's eyeglasses, not damaged
74	View of driver's seat position with respect to steering assembly, air bag, and console
75	Found position of the driver's active 3-point lap and shoulder belt system
76,77	Floor mounted attachment point of the belt webbing
78	Identification label on belt webbing
79	Driver's latchplate

**SLIDE INDEX (CONT'D.)**

80	Found position of the belt webbing and latchplate with cinch bar
81,82	Interior views from the rear seat area
83	Blood spatter on left front head restraint
84	Air bag module identification labels
85-87	Similar sized 61" tall driver in a Geo Storm with seat adjusted to full forward position
88	Lateral displacement of driver
89-90	Approximate position of driver as air bag deploys and contacts her left face
91-94	Trajectory of driver and facial/neck impact to right door pull handle and armrest
95-98	Hybrid III head form representing probable position of driver's head at contact with pull handle and armrest















150'





































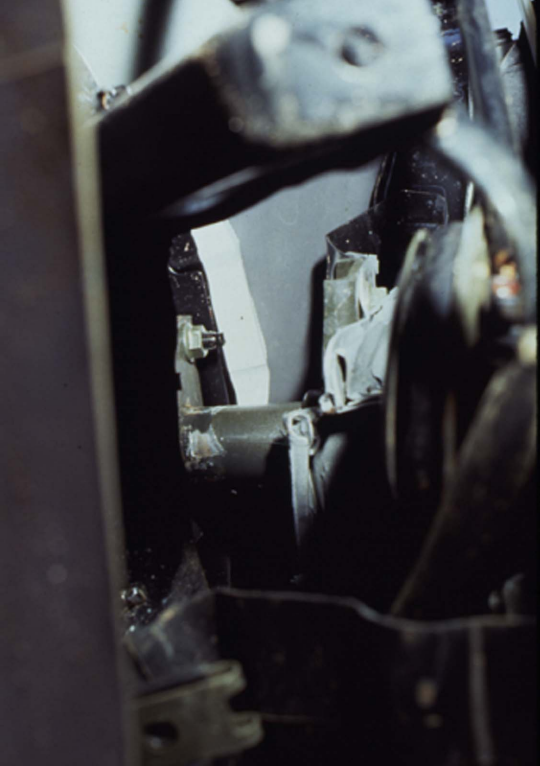




















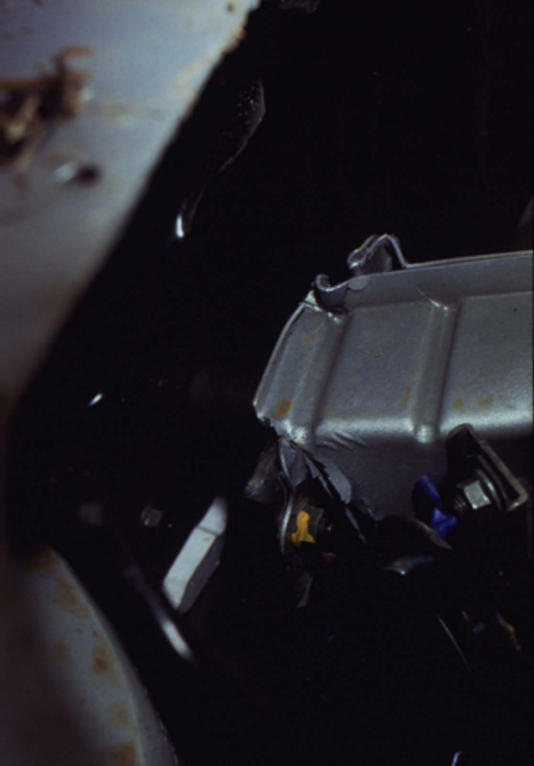




















MANUFACTURED BY  
IN JAPAN  
GVWR 3245LBS  
CWR FT. 1929LBS RA. 1422LBS  
THIS VEHICLE CONFORMS TO  
ALL APPLICABLE FEDERAL  
MOTOR VEHICLE SAFETY,  
BUMPER AND THEFT  
PREVENTION STANDARDS IN  
EFFECT ON THE DATE OF  
MANUFACTURE.  
JB1RT2358  
PASSENGER CAR

VEHICLE CAPACITY  
WEIGHT 660 LBS (302 KG)  
SEATING CAPACITY  
TOTAL 4  
FT 2 RN 2  
RECOMMENDED COLD TIRE  
INFLATION PRESSURES  
TIRE SIZES FRONT REAR  
P185/80R14 89V P185/80R14 89V  
30/210 30/210  
T115/70R14 80/415  
SEE OWNER'S MANUAL FOR  
ADDITIONAL INFORMATION

















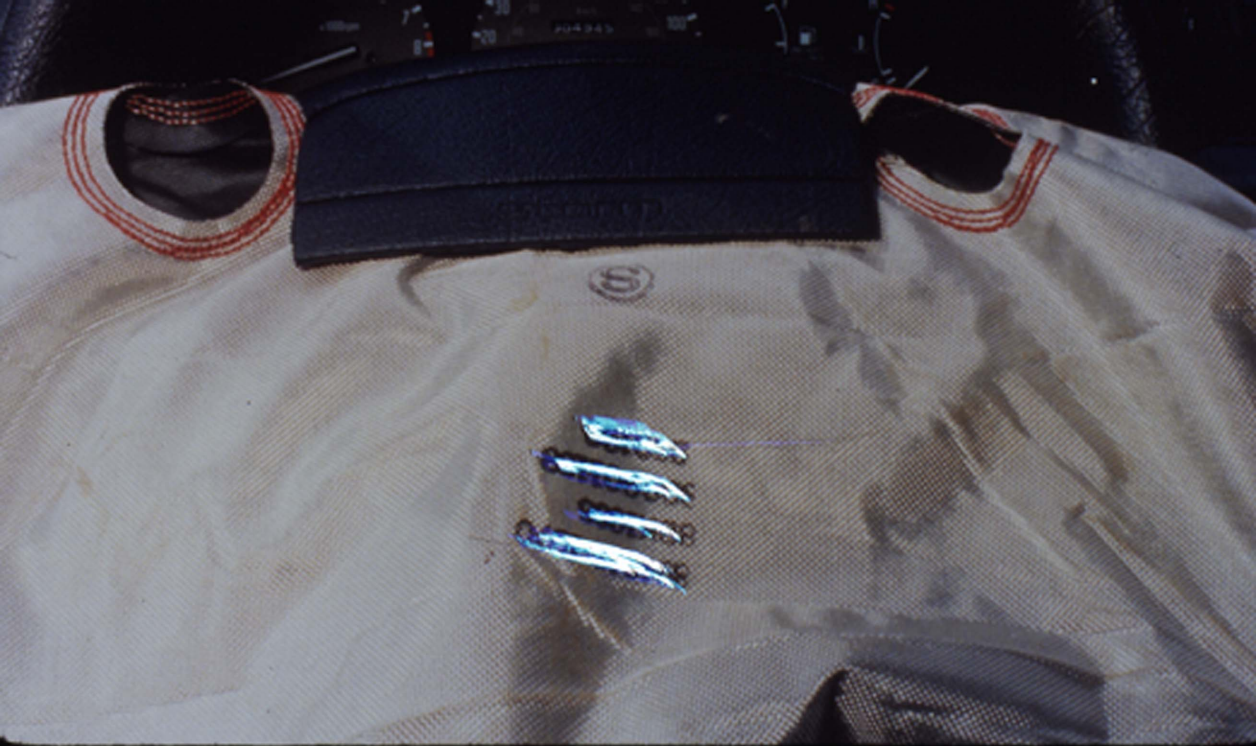










































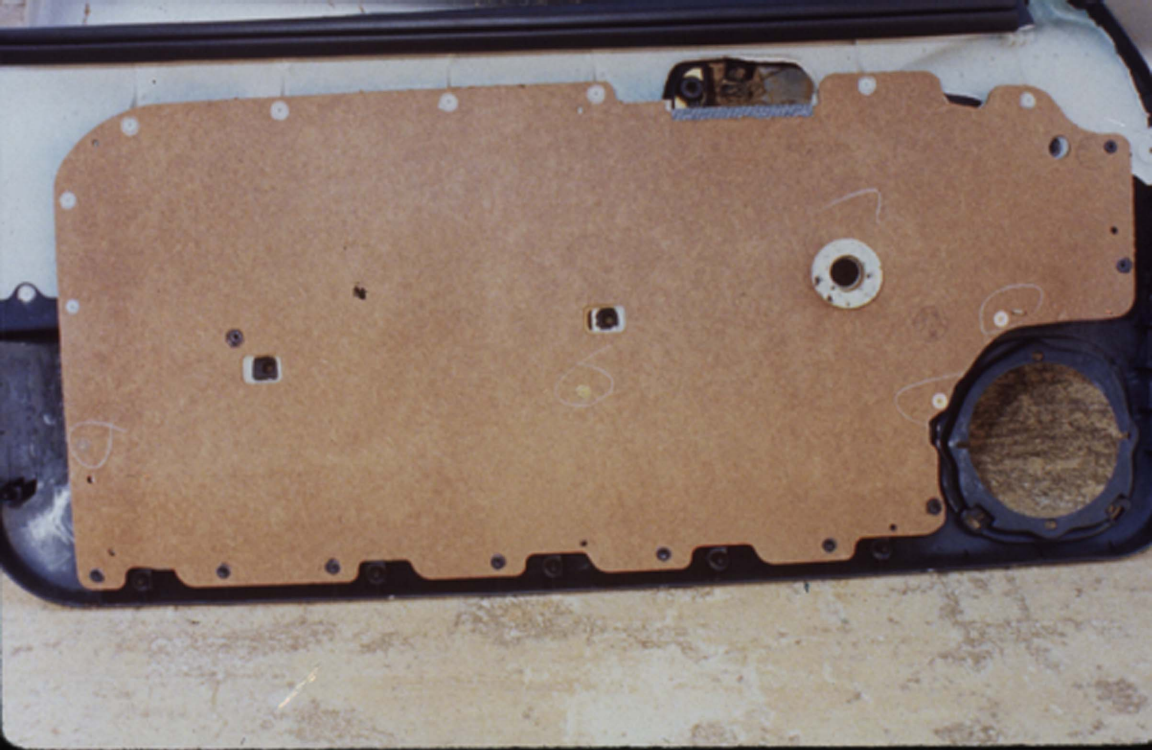




























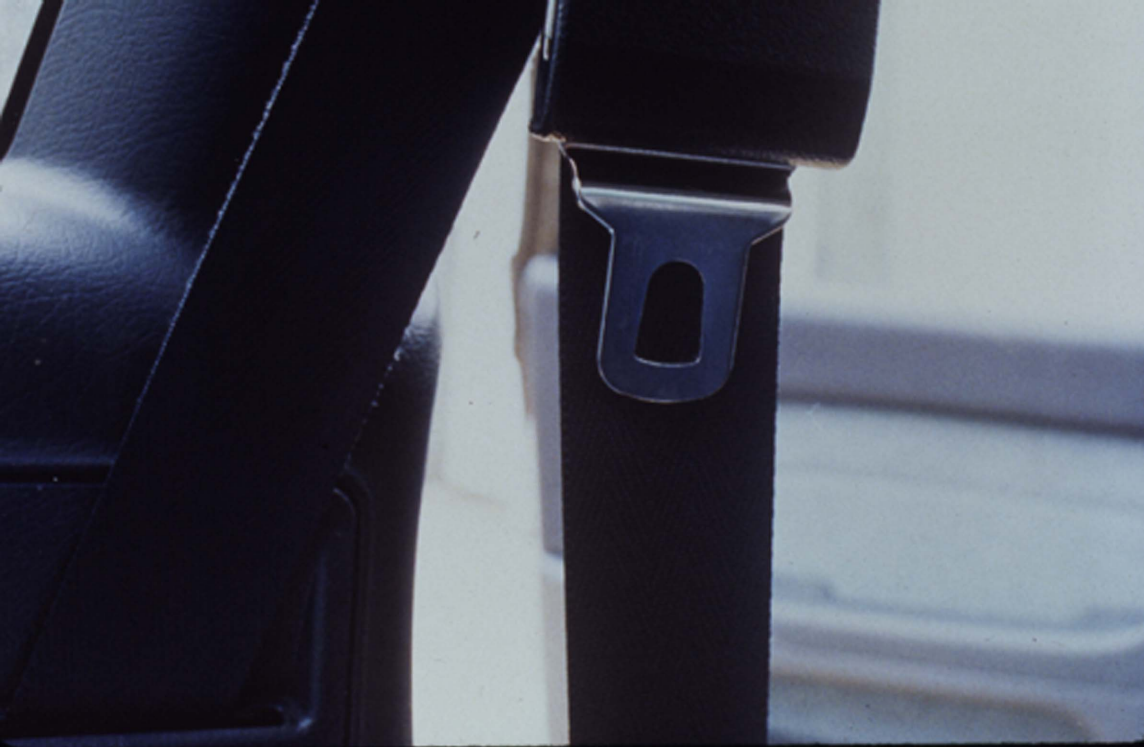




VEHICLE CAPACITY  
WEIGHT 500 LBS (227 KG)  
SEATING CAPACITY  
TOTAL 8  
GT 2 BK 2  
RECOMMENDED COLD TIRE  
INFLATION PRESSURES  
FRONT 30 PSI (2.1 BAR) REAR 30 PSI (2.1 BAR)  
TOWING CAPACITY  
TOWING 10,000 LBS (4,536 KG)  
TOWING 10,000 LBS (4,536 KG)  
TOWING 10,000 LBS (4,536 KG)





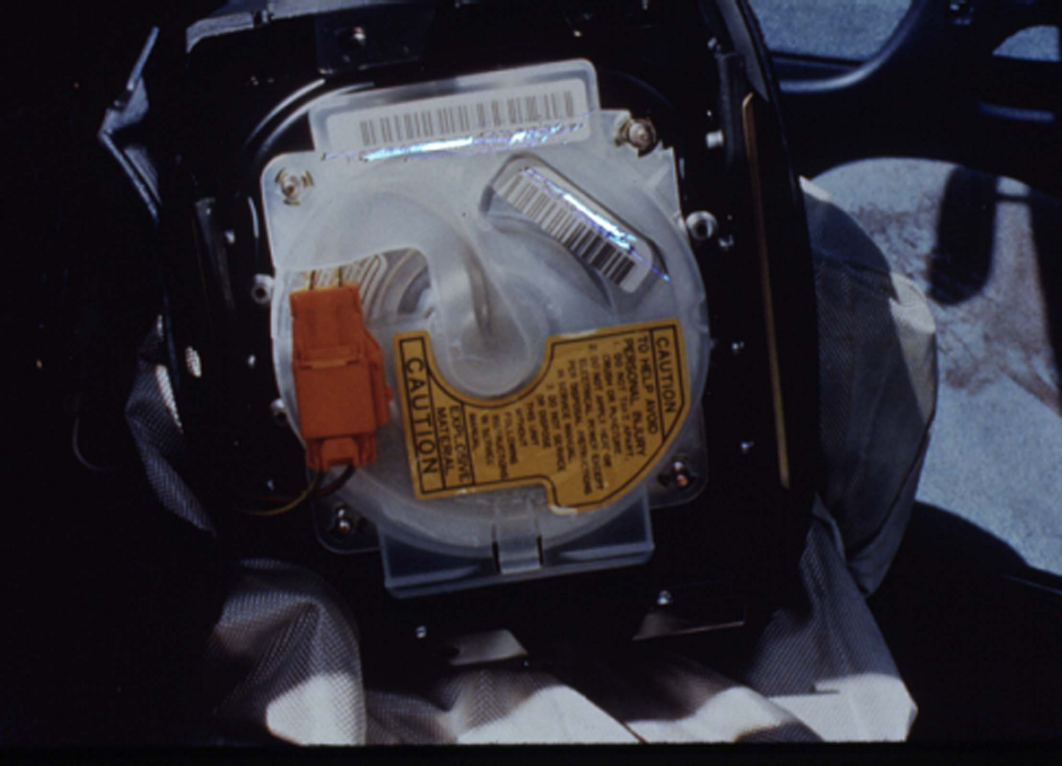


















































**APPENDIX A**

**Police Accident Report**

DATE OF ACCIDENT <b>Dec 1990</b>		DAY OF WEEK <b>WED</b>		HOUR <b>10:00</b>		
NONE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Investigating Agency: <b>[REDACTED]</b>		Sheriff <input type="checkbox"/> Other <input type="checkbox"/>		
Photographs Made: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Hit and Run: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Investigative Agency Number <b>[REDACTED]</b>		
LOCATION	Parish where accident occurred <b>[REDACTED]</b> City, Town <b>[REDACTED]</b>				DO NOT WRITE IN THIS BLOCK	
	Accident occurred on <b>[REDACTED]</b>					
	Troop Number or District and Zone <b>E</b>					
	On Interchange, <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Identify Quadrant NE SE NW SW					
<input type="checkbox"/> At its intersection with <b>[REDACTED]</b>		Name of intersecting St., Parish Rd., RR No., or Hwy. No. (U.S. or State)		SR-10 FURNISHED TO: YES NO Driver 1 <input type="checkbox"/> <input checked="" type="checkbox"/> Driver 2 <input type="checkbox"/> <input checked="" type="checkbox"/>		
<input type="checkbox"/> Relative to its intersection with <b>[REDACTED]</b> feet <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> of <b>[REDACTED]</b>		Intersecting Street or Highway		Carrying Hazardous Cargo: YES NO VEH. YES NO CLASS <b>[REDACTED]</b>		
<input checked="" type="checkbox"/> Not at intersection <b>16</b> tenths of mile <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> of <b>LA</b>		Street or Highway		1 <input type="checkbox"/> <input checked="" type="checkbox"/> 2 <input type="checkbox"/> <input type="checkbox"/>		
TOTAL NUMBER VEHICLES INVOLVED	Year <b>90</b> Make <b>Chev</b> Model <b>Geo Storm CSI</b> Type <b>2Dr</b> License Plate <b>[REDACTED]</b> State <b>[REDACTED]</b>	Year <b>99</b> Number <b>[REDACTED]</b>	VIN <b>J81RT2</b>			
	Vehicle <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <b>Removed 10/8/91</b>		Disabled <input type="checkbox"/> No <b>[REDACTED]</b>			
	Insurance Co. Name (NOT Agency Name) <b>[REDACTED]</b>		Policy Number <b>[REDACTED]</b>		Expiration Date <b>[REDACTED]</b>	
	Registered Owner's Name and Address <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Points of Impact <b>[REDACTED]</b>	
VEHICLE 1	Driver's Name and Address (Unless Same) <b>SAVE</b>		Date of Birth <b>[REDACTED]</b>		Damage Scale <b>[REDACTED]</b>	
	Dr. License State <b>[REDACTED]</b> License Number <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Number Injured <b>0</b>	
	Occupants' Names and Addresses <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Number Injured <b>0</b>	
	Occupants' Names and Addresses <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Number Injured <b>0</b>	
CODES	AREA DAMAGED <b>[REDACTED]</b>		SCALE <b>[REDACTED]</b>		POSITION <b>[REDACTED]</b>	
	EJECTION <b>[REDACTED]</b>		SEAT BELT/SH. HARNESS <b>[REDACTED]</b>		SAFETY DEVICES <b>[REDACTED]</b>	
VEHICLE 2	Year <b>[REDACTED]</b> Make <b>[REDACTED]</b> Model <b>[REDACTED]</b> Type <b>[REDACTED]</b> License Plate <b>[REDACTED]</b> State <b>[REDACTED]</b>		Year <b>[REDACTED]</b> Number <b>[REDACTED]</b>		VIN <b>[REDACTED]</b>	
	Vehicle <input type="checkbox"/> Yes <input type="checkbox"/> No <b>Removed 10/8/91</b>		Disabled <input type="checkbox"/> No <b>[REDACTED]</b>		Insurance Co. Name (NOT Agency Name) <b>[REDACTED]</b>	
	Policy Number <b>[REDACTED]</b>		Expiration Date <b>[REDACTED]</b>		Points of Impact <b>[REDACTED]</b>	
	Registered Owner's Name and Address <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Damage Scale <b>[REDACTED]</b>	
Driver's Name and Address (Unless Same) <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Number Injured <b>[REDACTED]</b>		
Dr. License State <b>[REDACTED]</b> License Number <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Number Injured <b>[REDACTED]</b>		
Occupants' Names and Addresses <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Number Injured <b>[REDACTED]</b>		
Occupants' Names and Addresses <b>[REDACTED]</b>		Date of Birth <b>[REDACTED]</b>		Number Injured <b>[REDACTED]</b>		
PEDESTRIAN	Name and Address <b>[REDACTED]</b>		Clothing <input type="checkbox"/> Light <input type="checkbox"/> Dark		Sex <b>[REDACTED]</b> Age <b>[REDACTED]</b>	
	Damage to Property Other Than Vehicles/Name and Address of Owner of Object Struck <b>Bridge Guard Rail Bent</b>		STATE OF <b>[REDACTED]</b>		Available: <input type="checkbox"/> Yes <input type="checkbox"/> No	
OTHER DAMAGE	Ambulance Called By <b>[REDACTED]</b> At <b>[REDACTED]</b> Arrived <b>[REDACTED]</b> Departed <b>[REDACTED]</b>		Special Equipment Needed <b>NONE</b>		Available: <input type="checkbox"/> Yes <input type="checkbox"/> No	
	Refused <b>[REDACTED]</b> First Aid Given By <b>[REDACTED]</b>		Injured Taken To/By <b>[REDACTED]</b>		SOURCE OF <b>[REDACTED]</b> Dr. or Nurse <b>[REDACTED]</b>	
EMERGENCY SERVICES	Refused <b>[REDACTED]</b> First Aid Given By <b>[REDACTED]</b>		Injured Taken To/By <b>[REDACTED]</b>		FIRST AID <b>[REDACTED]</b> EMT <b>[REDACTED]</b>	
	Refused <b>[REDACTED]</b> First Aid Given By <b>[REDACTED]</b>		Injured Taken To/By <b>[REDACTED]</b>		AVAILABLE <b>[REDACTED]</b> Other <b>[REDACTED]</b>	
ALCOHOL TEST	YES <input type="checkbox"/> RESULTS <b>[REDACTED]</b> PENDING NO <input type="checkbox"/>		VIDEO TAPES <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		TIME <b>[REDACTED]</b>	
	Dr. 1 <input type="checkbox"/> Dr. 2 <input type="checkbox"/> Ped <input type="checkbox"/>		Notified of Accident <b>[REDACTED]</b>		OFFICER'S SIGNATURE <b>[REDACTED]</b>	
Investigation Complete: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Rank & Name <b>[REDACTED]</b>		Badge No. <b>[REDACTED]</b> Dept. <b>[REDACTED]</b>		

**(Check One Per Column)**

1 2

A ☐ Exceeding stated speed limit

B ☐ Exceeding safe speed limit

C ☐ Failure to yield

D ☐ Following too closely

E ☐ Driving left of center

F ☐ Cutting in, improper passing

G ☐ Failure to signal

H ☐ Made wide right turn

I ☐ Cut corner on left turn

J ☐ Turned from wrong lane

K ☐ Other improper turning

L ☐ Disregarded traffic control

M ☐ Improper starting

N ☐ Improper parking

O ☐ Failed to set out flags, flares

P ☐ Failed to dim headlights

Q ☐ Vehicle condition

R ☐ Driver condition

S ☐ Other (hazardous) or unknown violations

T ☐ No violations

**(Check One Per Column)**

1 2

A ☐ Stopped

B ☐ Proceeding ahead

C ☐ Traveling w/o way

D ☐ Backing

E ☐ Crossed median into opposing lane

F ☐ Crossed center line into opposing lane

G ☐ Ran off road (not while making turn at intersection)

H ☐ Changing lanes on multi-lane road

I ☐ Making left turn

J ☐ Making right turn

K ☐ Stopped preparing to, or making, turn

L ☐ Making turn, direction unknown

M ☐ Stopped, preparing to turn left

N ☐ Stopped, preparing to turn right

O ☐ Slowing to make left turn

P ☐ Slowing to make right turn

Q ☐ Slowing to stop

R ☐ Properly parked

S ☐ Parking maneuver

T ☐ Entering traffic from shoulder

U ☐ Entering traffic from median

V ☐ Entering traffic from parking lane

W ☐ Entering traffic from private lane

X ☐ Entering roadway from on ramp

Y ☐ Leaving roadway via off ramp

Z ☐ Other or unknown

**(Check One Per Column)**

1 2

A ☐ Rain, snow, etc. on windshield

B ☐ Windshield otherwise obscured

C ☐ Vision obscured by load

D ☐ Trees, bushes, etc.

E ☐ Building

F ☐ Embankment

G ☐ Sign boards

H ☐ Hillcrest

I ☐ Paraded vehicles

J ☐ Moving vehicles

K ☐ Blinded by headlights

L ☐ Blinded by sun

M ☐ Blinded by moon

N ☐ Lights in field of view

O ☐ Other or unknown

P ☐ No obstructions

**(Check One Per Column)**

1 2

A ☐ Daylight

B ☐ Dark-no street lights

C ☐ Dusk or dawn

D ☐ Dark-continuous street light

E ☐ Dark-street lights at intersection only

F ☐ Unknown

**(Check One Per Column)**

1 2

A ☐ Clear

B ☐ Cloudy

C ☐ Raining

D ☐ Snowing/sleeting

E ☐ Fog

F ☐ Smoke

G ☐ Dust

H ☐ Unknown

**(Check One Per Column)**

1 2

A ☐ Headlights on

B ☐ Headlights off

C ☐ Unknown

**(Check One Per Column)**

1 2

A ☐ Crossing entering road or intersection

B ☐ Crossing entering road not at intersection

C ☐ Waiting in road-with traffic

D ☐ Waiting in road-against traffic

E ☐ Stopping in roadway

F ☐ Stopping in driveway

G ☐ Getting in or out of vehicle

H ☐ Pushing, working on vehicle in road

I ☐ Other improper in roadway

J ☐ Laying in roadway

K ☐ Other in roadway

L ☐ Not in roadway or unknown-vehicle

**(Check One Per Column)**

1 2

A ☐ Straight-level

B ☐ Curve-level

C ☐ On grade-straight

D ☐ On grade-curve

E ☐ Hillcrest-straight

F ☐ Hillcrest-curve

G ☐ Dip, hump-straight

H ☐ Dip, hump-curve

I ☐ Other or unknown

**(Check One Per Column)**

1 2

A ☐ Stop sign

B ☐ Yield sign

C ☐ Red signal on

D ☐ Yellow signal on

E ☐ Green signal on

F ☐ Red light out of order

G ☐ Green light out of order

H ☐ Flashing yellow

I ☐ Flashing red

J ☐ Other, watchman

K ☐ RR crossing sign

L ☐ Railroad crossing

M ☐ Railroad crossing

N ☐ Railroad crossing

O ☐ Warning sign

P ☐ School crossing

Q ☐ Yellow to proceed

R ☐ White dashed line

S ☐ No control

T ☐ Other or unknown

U ☐ Yellow dashed line

V ☐ Blue line

**(Check One Per Column)**

1 2

A ☐ Defective shoulders

B ☐ Holes

C ☐ Deep ruts

D ☐ Bumps

E ☐ Loose surface material

F ☐ Construction, repair

G ☐ Overhead clearance limited

H ☐ Construction-no warning

I ☐ Previous accident

J ☐ Flooding

K ☐ Water on roadway

L ☐ Orthogonal fault in road surface

M ☐ Parallel fault in road surface

N ☐ Other or unknown defects

O ☐ No defects

**(Check One Per Column)**

1 2

A ☐ Dry

B ☐ Wet

C ☐ Muddy

D ☐ Snowy, icy

E ☐ Other or Unknown

F ☐ Other or Unknown

**(Check One Per Column)**

1 2

A ☐ Defective brakes

B ☐ Defective headlights

C ☐ Defective rear lights

D ☐ Defective signal lights

E ☐ Air brake out

F ☐ Defective steering

G ☐ Tire failure

H ☐ Worn or smooth tires

I ☐ Engine failure

J ☐ No defects observed

K ☐ Other or unknown defects

NORTH

Bridge

Impact Bridge Guard Rail

VEH.	DIRECTION BEFORE ACCIDENT		OBJECT STRUCK (Not Vehicle)		FINAL LOCATION OF VEHICLES	DISTANCE TRAVELED AFTER IMPACT	SPEED		BY SCENARIO DATA
	Headed	On Street or Highway	1st	2nd			EST.	POSTED	
1	West		Bridge		Ditch	82ft	45	55	50
2									

Describe any unusual circumstances associated with the accident, contributing factors not otherwise noted, witnesses names, addresses, etc. (Refer to each vehicle by no.)

Veh #1 was traveling West on [redacted]. Was raining. Veh #1 went out of control, spun several times and struck the left guard rail of bridge. Veh #1 then spun again and went off roadway at the end of guard rail. Veh. #1 went backwards down into ditch and into some small bushes at a slow speed. Very minor damage to front of vehicle with impact to bridge rail. No damage from small bushes. Damage to front of Veh. #1 was several scrape marks across the entire front of vehicle. Air Bag was deflated. Seat was in the most forward position. Wit: [redacted] was traveling East meeting Veh. #1. stated that the vehicle started spinning on roadway and struck bridge twice. Stated that vehicle did not appear to be going fast. Stated

**UNIFORM MOTOR VEHICLE TRAFFIC ACCIDENT REPORT  
SUPPLEMENTAL REPORT**

Investigating Agency ☐ State Police ☐ Sheriff  
☐ City Police ☐ Other

STATE COMPUTER NUMBER

Investigative Agency Number

TIME  LOCATION	DATE OF ACCIDENT	19 90	DAY OF WEEK	HOUR
	Parish where Accident occurred			
	City, Town			
Name of St., Parish Rd. or Hwy. No. (U.S. or State)				
Milepost				

DO NOT WRITE IN THIS SPACE

DESCRIBE ANY UNUSUAL CIRCUMSTANCES ASSOCIATED WITH THE ACCIDENT, WITNESSES NAMES, ADDRESSES, ETC. (REFER TO EACH VEHICLE BY #)

on file. Wit: [redacted], LA [redacted], La. [redacted] was behind Wit: [redacted] and stated that he did not see Veh 1 spinning. Stated that he saw the vehicle roll backwards the ditch. Stated he followed [redacted] to Veh #1 and observed the driver slumped over the seat with legs under the wheel and head in the passenger seat. Stated that he did not observe if seat belt was in use. Neither witness stated that the seat belt was observed in use. Both stated that they observed a strange odor in vehicle. The bent rail and scrape marks on the bridge rail (EAST BOUND SIDE) was all the marks that could be located on bridge. The marks were approx. [redacted] from where Veh. #1 rolled backwards off roadway.

**APPENDIX B**

**NASS Vehicle Forms**





## GENERAL VEHICLE FORM

1. Primary Sampling Unit Number     

2. Case Number ~~Stratum~~ 91-03

3. Vehicle Number 01

### VEHICLE IDENTIFICATION

4. Vehicle Model Year 90

Code the last two digits of the model year  
(99) Unknown

5. Vehicle Make (specify): 20  
Geo

Applicable codes are found in your  
NASS CDS Data Collection, Coding, and  
Editing Manual.  
(99) Unknown

6. Vehicle Model (specify): 035  
Storm GSi

Applicable codes are found in your  
NASS CDS Data Collection, Coding, and  
Editing Manual.  
(999) Unknown

7. Body Type 03  
Note: Applicable codes are found on  
the back of this page.

8. Vehicle Identification Number  
J81RT23  
Left justify; Slash zeros and letter Z (0 and Z)  
No VIN—Code all zeros  
Unknown—Code all nine's

### OFFICIAL RECORDS

9. Police Reported Vehicle Disposition 1  
(0) Not towed due to vehicle damage  
(1) Towed due to vehicle damage  
(9) Unknown

10. Police Reported Travel Speed 45  
Code to the nearest mph (NOTE: 00 means  
less than 0.5 mph)  
(97) 96.5 mph and above  
(99) Unknown

11. Police Reported Alcohol or Drug Presence 0

- (0) Neither alcohol nor drugs present
- (1) Yes (alcohol present)
- (2) Yes (drugs present)
- (3) Yes (alcohol and drugs present)
- (4) Yes (alcohol or drugs present—specifics unknown)
- (7) Not reported
- (8) No driver present
- (9) Unknown

12. Alcohol Test Result for Driver 96

- Code actual value (decimal implied before first digit—0.xx)
- (95) Test refused
  - (96) None given
  - (97) AC test performed, results unknown
  - (98) No driver present
  - (99) Unknown

Source     

### ACCIDENT RELATED

13. Speed Limit 55  
(00) No statutory limit  
Code posted or statutory speed limit  
(99) Unknown

14. Attempted Avoidance Maneuver 99  
(00) No impact  
(01) No avoidance actions  
(02) Braking (no lockup)  
(03) Braking (lockup)  
(04) Braking (lockup unknown)  
(05) Releasing brakes  
(06) Steering left  
(07) Steering right  
(08) Braking and steering left  
(09) Braking and steering right  
(10) Accelerating  
(11) Accelerating and steering left  
(12) Accelerating and steering right  
(97) No driver present  
(98) Other action (specify):  
    

(99) Unknown

15. Accident Type 07  
Applicable codes may be found on the back  
of page two of this field form  
(00) No impact  
Code the number of the diagram that  
best describes the accident circumstance  
(98) Other accident type (specify):  
      
(99) Unknown

\*\*\*\* STOP HERE IF GV07 DOES NOT EQUAL 01-49 \*\*\*\*

## CODES FOR BODY TYPE

### CDS APPLICABLE VEHICLES

#### Automobiles

- (01) Convertible (excludes sun-roof, t-bar)
- (02) 2-door sedan, hardtop, coupe
- (03) 3-door/2-door hatchback
- (04) 4-door sedan, hardtop
- (05) 5-door/4-door hatchback
- (06) Station wagon (excluding van and truck based)
- (08) Other automobile type (specify): \_\_\_\_\_

- 
- (09) Unknown automobile type

#### Automobile Derivatives

- (10) Auto based pickup (includes El Camino, Caballero, Ranchero, and Brat)
- (11) Auto based panel (cargo station wagon, includes auto based ambulance/hearse)
- (12) Large limousine—more than four side doors or stretched chassis

#### Utility Vehicles

- (13) Short utility—not truck based (includes Jeep CJ-5, Jeep CJ-7, Renegade, Landrover, Pre-78 Bronco, Landcruiser, Thing)
- (14) Truck based utility (2-door; includes Blazer, Bronco—78 on, Bronco II, Jimmy, Ramcharger, Cherokee, Trailduster, Scout)

#### Van Based Light Trucks ( $\leq$ 10,000 lbs GVWR)

- (20) Minivan (Lumina APV, Astro, Caravan, Plymouth Vista, Aerostar, Safari, Voyager [84 and after], Dodge Vista, Mini Ram Van, Toyota Cargo Van, Toyota Van, Vanagon, VW Bus, Kombi)
- (21) Standard van (Sportvan, Chevy Van, Club Wagon, Ford Econoline, Ram Van, Chateau, Ram Wagon, Vandura, Rally, Voyager [83 and before], Beauville, Sportsman)
- (28) Other van type (specify): \_\_\_\_\_
- (29) Unknown van type

#### Light Conventional Trucks (Pickup Style Cab, $\leq$ 10,000 lbs GVWR)

- (30) Compact pickup ( $\leq$  4,500 lbs. GVWR, S-10, LUV, Ram 50, Rampage, Courier, Ranger, S-15 Pup, Mazda Pickup, Mitsubishi Truck, Nissan Pickup, Arrow Pickup, Scamp, Toyota Pickup, VW Pickup)
- (31) Standard pickup (4,500 to 10,000 lbs. GVWR, C10 - C30, K10 - K30, T10, D100 - D350, W150 - W350, F100 - F350, Comanche, J10 - J30, Dakota)
- (32) Pickup with slide-in camper
- (33) Truck based station wagon (4-door; includes Suburban, Travelall, Wagoneer)
- (34) Light truck based suburban limousine
- (35) Convertible pickup
- (39) Unknown (pickup style) light conventional truck type

#### Other Light Trucks ( $\leq$ 10,000 lbs GVWR)

- (40) Cab chassis based (includes rescue vehicle, light stake, dump, and tow truck)
- (41) Truck based panel
- (42) Light truck based motorhome (chassis mounted)
- (47) Other light conventional truck type (not a pickup) (specify): \_\_\_\_\_
- (48) Unknown other light truck type (not a pickup)
- (49) Unknown light vehicle type (automobile, van, or light truck)

### OTHER VEHICLES

#### Buses (Excludes Van Based)

- (50) School bus (designed to carry students, not cross country or transit)
- (58) Other bus type (e.g., transit, intercity, bus based motorhome) (specify): \_\_\_\_\_
- (59) Unknown bus type

#### Medium/Heavy Trucks ( $>$ 10,000 lbs GVWR)

- (60) Step van
- (61) Single unit straight truck (10,000 lbs  $<$  GVWR  $\leq$  26,000 lbs)
- (62) Single unit straight truck ( $>$  26,000 lbs GVWR)
- (63) Medium/heavy truck based motorhome
- (64) Truck-tractor with no cargo trailer
- (65) Truck-tractor pulling one trailer
- (66) Truck-tractor pulling two or more trailers
- (67) Truck-tractor (unknown if pulling trailer)
- (68) Unknown medium/heavy truck type
- (69) Unknown truck type (light/medium/heavy)

#### Motored Cycles (Does Not Include All-Terrain Vehicles/Cycles)

- (70) Motorcycle
- (71) Moped (motorized bicycle)
- (78) Other motored cycle type (minibike, motorscooter) (specify): \_\_\_\_\_

- 
- (79) Unknown motored cycle type

#### Other Vehicles

- (80) ATV (All-Terrain Vehicle) and ATC (All-Terrain Cycle)
- (88) Other vehicle type (specify): \_\_\_\_\_

- 
- (99) Unknown body type

**OCCUPANT RELATED**16. Driver Presence in Vehicle 1

- (0) Driver not present  
(1) Driver present  
(9) Unknown

17. Number of Occupants This Vehicle 01

- (00-96) Code actual number of occupants for this vehicle  
(97) 97 or more  
(99) Unknown

18. Number of Occupant Forms Submitted 01**VEHICLE WEIGHT ITEMS**19. Vehicle Curb Weight 02,300

~~2282~~ Code weight to nearest 100 pounds.

- (010) Less than 1050 pounds  
(135) 13,500 lbs or more  
(999) Unknown

Source:                     

20. Vehicle Cargo Weight 0000

Code weight to nearest 100 pounds.

- (00) Less than 50 pounds  
(97) 9,650 lbs or more  
(99) Unknown

**RECONSTRUCTION DATA**21. Towed Trailing Unit 0

- (0) No towed unit  
(1) Yes – towed trailing unit  
(9) Unknown

22. Documentation of Trajectory Data for This Vehicle 0

- (0) No  
(1) Yes

23. Post Collision Condition of Tree or Pole (for Highest Delta V) 0

- (0) Not collision (for highest delta V) with tree or pole  
(1) Not damaged  
(2) Cracked/sheared  
(3) Tilted <45 degrees  
(4) Tilted ≥45 degrees  
(5) Uprooted tree  
(6) Separated pole from base  
(7) Pole replaced  
(8) Other (specify):  
\_\_\_\_\_

(9) Unknown

24. Rollover 0

- (0) No rollover (no overturning)

Rollover (primarily about the longitudinal axis)

- (1) Rollover, 1 quarter turn only  
(2) Rollover, 2 quarter turns  
(3) Rollover, 3 quarter turns  
(4) Rollover, 4 or more quarter turns (specify):  
\_\_\_\_\_

- (5) Rollover – end-over-end (i.e., primarily about the lateral axis)

- (9) Rollover (overturn), details unknown

**OVERRIDE/UNDERRIDE (THIS VEHICLE)**25. Front Override/Underride (this vehicle) 026. Rear Override/Underride (this vehicle) 0

- (0) No override/underride, or not an end-to-end impact

Override (see specific CDC)

- (1) 1st CDC  
(2) 2nd CDC  
(3) Other not automated CDC (specify):  
\_\_\_\_\_

Underride (see specific CDC)

- (4) 1st CDC  
(5) 2nd CDC  
(6) Other not automated CDC (specify):  
\_\_\_\_\_

- (7) Medium/heavy truck override

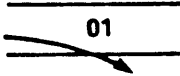
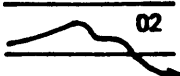
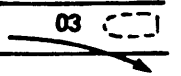

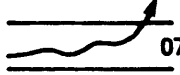
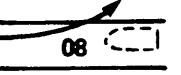
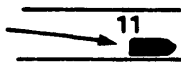
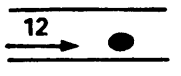
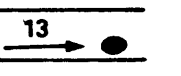
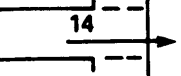
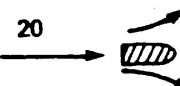
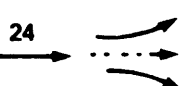
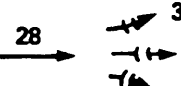


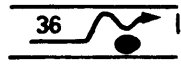

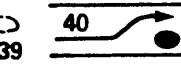
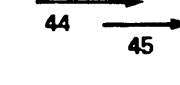

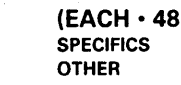


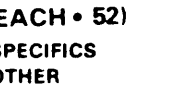
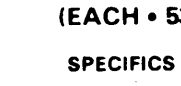

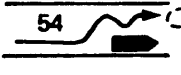
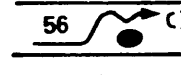
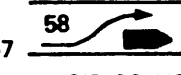
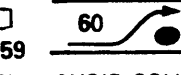

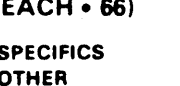


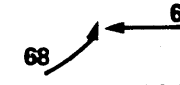
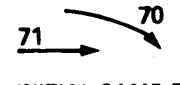


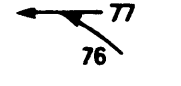
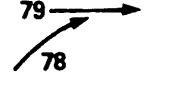
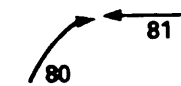
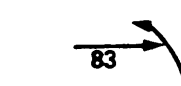
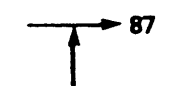



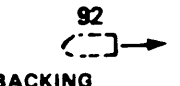

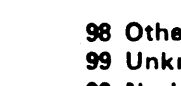


- (9) Unknown

**HEADING ANGLE AT IMPACT FOR HIGHEST DELTA V**

Values: (000)-(359) Code actual value

- (997) Noncollision  
(998) Impact with object  
(999) Unknown

27. Heading Angle for This Vehicle 99828. Heading Angle for Other Vehicle 998

Category	Configuration	ACCIDENT TYPES (Includes Intent)				
I. Single Driver	A. Right Roadside Departure	 01 DRIVE OFF ROAD	 02 CONTROL/ TRACTION LOSS	 03 AVOID COLLISION WITH VEH., PED., ANIM.	04 SPECIFICS OTHER	05 SPECIFICS UNKNOWN
	B. Left Roadside Departure	 06 DRIVE OFF ROAD	 07 CONTROL/ TRACTION LOSS	 08 AVOID COLLISION WITH VEH., PED., ANIM.	09 SPECIFICS OTHER	10 SPECIFICS UNKNOWN
	C. Forward Impact	 11 PARKED VEH.	 12 STA. OBJECT	 13 PEDESTRIAN/ ANIMAL	 14 END DEPARTURE	15 SPECIFICS OTHER 16 SPECIFICS UNKNOWN
II. Same Trafficway Same Direction	D. Rear-End	 20 STOPPED 21, 22, 23	 22 SLOWER 25, 26, 27	 24 DECEL. 29, 30, 31	 26 AVOID COLLISION WITH VEH.	(EACH • 32) SPECIFICS OTHER (EACH • 33) SPECIFICS UNKNOWN
	E. Forward Impact	 34 CONTROL/ TRACTION LOSS	 36 CONTROL/ TRACTION LOSS	 38 AVOID COLLISION WITH VEH.	 40 AVOID COLLISION WITH OBJECT	(EACH • 42) SPECIFICS OTHER (EACH • 43) SPECIFICS UNKNOWN
	F. Sideswipe Angle	 44 LATERAL MOVE	 46 LATERAL MOVE	 48 LATERAL MOVE	 49 LATERAL MOVE	(EACH • 48) SPECIFICS OTHER (EACH • 49) SPECIFICS UNKNOWN
III. Same Trafficway Opposite Direction	G. Head-On	 50 LATERAL MOVE	 51 LATERAL MOVE	 52 LATERAL MOVE	 53 LATERAL MOVE	(EACH • 52) SPECIFICS OTHER (EACH • 53) SPECIFICS UNKNOWN
	H. Forward Impact	 54 CONTROL/ TRACTION LOSS	 56 CONTROL/ TRACTION LOSS	 58 AVOID COLLISION WITH VEH.	 60 AVOID COLLISION WITH OBJECT	(EACH • 62) SPECIFICS OTHER (EACH • 63) SPECIFICS UNKNOWN
	I. Sideswipe Angle	 64 LATERAL MOVE	 65 LATERAL MOVE	 66 LATERAL MOVE	 67 LATERAL MOVE	(EACH • 66) SPECIFICS OTHER (EACH • 67) SPECIFICS UNKNOWN
IV. Change Trafficway Vehicle Turning	J. Turn Across Path	 68 INITIAL OPPOSITE DIRECTIONS	 69 INITIAL SAME DIRECTIONS	 70 INITIAL SAME DIRECTIONS	 71 INITIAL SAME DIRECTIONS	(EACH • 74) SPECIFICS OTHER (EACH • 75) SPECIFICS UNKNOWN
	K. Turn Into Path	 76 TURN INTO SAME DIRECTION	 77 TURN INTO SAME DIRECTION	 78 TURN INTO OPPOSITE DIRECTIONS	 79 TURN INTO OPPOSITE DIRECTIONS	(EACH • 84) SPECIFICS OTHER (EACH • 85) SPECIFICS UNKNOWN
V. Intersecting Paths (Vehicle Damage)	L. Straight Paths	 86 STRAIGHT PATHS	 87 STRAIGHT PATHS	 88 STRAIGHT PATHS	 89 STRAIGHT PATHS	(EACH • 90) SPECIFICS OTHER (EACH • 91) SPECIFICS UNKNOWN
VI. Miscellaneous	M. Backing Etc.	 92 BACKING VEH.	 93 OTHER VEH. OR OBJECT	 94 OTHER ACCIDENT TYPE	 95 UNKNOWN ACCIDENT TYPE	 96 NO IMPACT

## 29. Basis for Total Delta V (Highest)

## Delta V Calculated

- (1) CRASH program – damage only routine
- (2) CRASH program – damage and trajectory routine
- (3) Missing vehicle algorithm

## Delta V Not Calculated

- (4) At least one vehicle (which may be this vehicle) is beyond the scope of an acceptable reconstruction program, regardless of collision conditions.
- (5) All vehicles within scope (CDC applicable) of CRASH program but one of the collision conditions is beyond the scope of the CRASH program or other acceptable reconstruction techniques, regardless of adequacy of damage data.
- (6) All vehicles and collision conditions are within scope of one of the acceptable reconstruction programs, but there is insufficient data available.

**COMPUTER GENERATED DELTA V**

## 30. Total Delta V

Secondary Highest

99

\_\_\_\_ Nearest mph

(NOTE: 00 means less than  
0.5 mph)  
(97) 96.5 mph and above  
(99) Unknown

## 31. Longitudinal Component of Delta V

+ 99

\_\_\_\_ Nearest mph

(NOTE: \_\_00 means greater than  
-0.5 and less than +0.5 mph)  
(± 97) ± 96.5 mph and above  
(\_\_ 99) Unknown

## 32. Lateral Component of Delta V

Secondary Highest

+ 99

\_\_\_\_ Nearest mph

(NOTE: \_\_00 means greater than  
-0.5 and less than +0.5 mph)  
(± 97) ± 96.5 mph and above  
(\_\_ 99) Unknown

## 33. Energy Absorption

999,900

\_\_\_\_ Nearest 100 foot-lbs

(NOTE: 0000 means less than 50 Foot-Lbs)  
(9997) 999,650 foot-lbs or more  
(9999) Unknown

## 34. Confidence in Reconstruction Program Results (for Highest Delta V)

0

- (0) No reconstruction
- (1) Collision fits model – results appear reasonable
- (2) Collision fits model – results appear high
- (3) Collision fits model – results appear low
- (4) Borderline reconstruction – results appear reasonable

## 35. Type of Vehicle Inspection

1

- (0) No Inspection
- (1) Complete inspection
- (2) Partial inspection (specify):

## 36. Is this an AOPS Vehicle?

- (0) No
- (1) Yes

\*\*\* STOP: IF THE CDS APPLICABLE VEHICLE WAS NOT INSPECTED (I.E., GV35 = 0), \*\*\*  
DO NOT COMPLETE THE EXTERIOR AND INTERIOR VEHICLE FORMS.

1. Primary Sampling Unit Number	91-03	3. Vehicle Number	01
---------------------------------	-------	-------------------	----

## VEHICLE IDENTIFICATION

VIN J81RT235 Model Year 1990  
Vehicle Make (specify): GEO Vehicle Model (specify): STORM GSi

## LOCATOR

Locate the end of the damage with respect to the vehicle longitudinal center line or bumper corner for end impacts or an undamaged axle for side impacts.

Specific Impact No.	Location of Direct Damage	Location of Field L	Location of Maximum Crush
1	RR ALUMINUM WHEEL		
2	FRONT BUMPER, DISTRIBUTED	FULL FRONTAL WIDTH	AT LF BUMPER CORNER

## CRUSH PROFILE

NOTES: Identify the plane at which the C-measurements are taken (e.g., at bumper, above bumper, at sill, above sill, etc.) and label adjustments (e.g., free space).

Measure C1 to C6 from driver to passenger side in front or rear impacts and rear to front in side impacts.

Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

Use as many lines/columns as necessary to describe each damage profile.

[illegible]

## VEHICLE DAMAGE SKETCH

## TIRE – WHEEL DAMAGE

a. Rotation physically restricted b. Tire deflated

RF 2RF 2LF 2LF 2RR 2RR 2LR 2LR 2

(1) Yes (2) No (8) NA (9) Unk.

## TYPE OF TRANSMISSION

5-SPEED

☒ Manual☐ Automatic

## ORIGINAL SPECIFICATIONS

Wheelbase

96.5"

Overall Length

163.4"

Maximum Width

66.7"

Curb Weight

2282 lbs.

Average Track

55.75"

Front Overhang

38.3"

Rear Overhang

28.6"

Engine Size: cyl./ displ.

4cyl/1.6cyl

Undeformed End Width

53.0"

## WHEEL STEER ANGLES

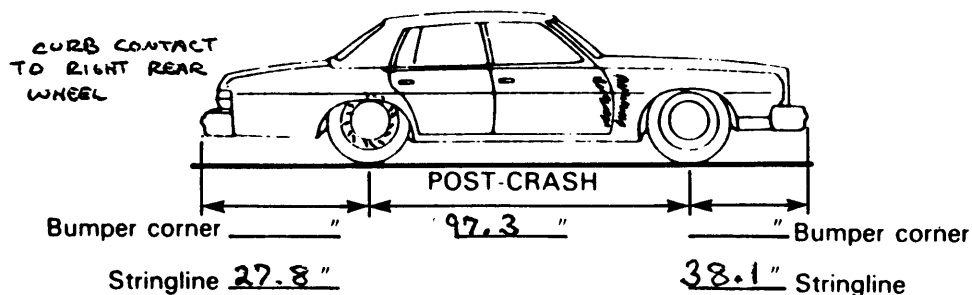
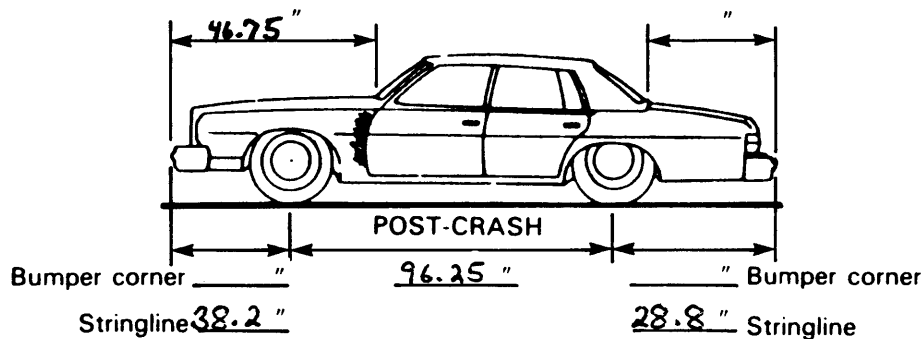
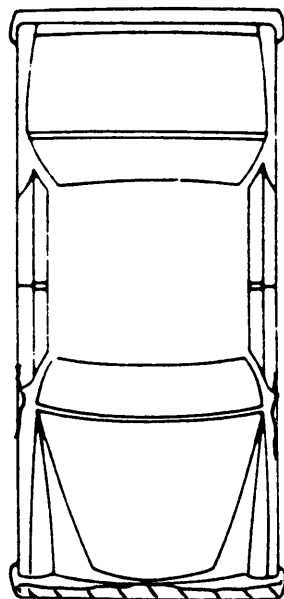
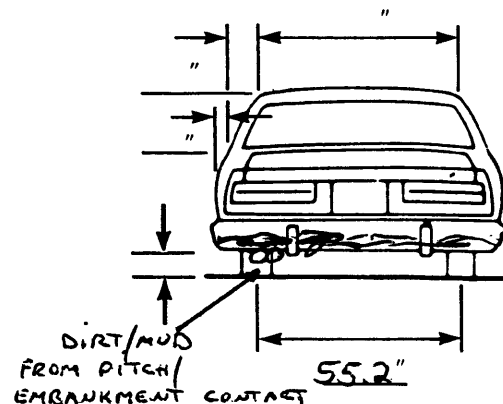
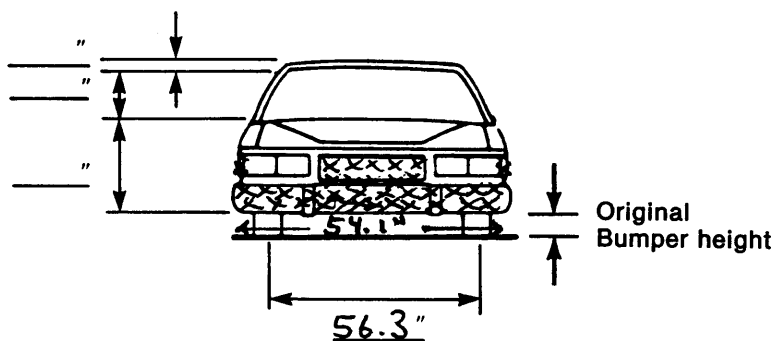
(For locked front wheels or displaced rear axles only)

RF  $\pm$  —°LF  $\pm$  —°RR  $\pm$  10°LR  $\pm$  —°Within  $\pm 5$  degrees

## DRIVE WHEELS

☒ FWD☐ RWD☐ 4WD

Approximate

Cargo Weight N/A

NOTES: Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of striations, scuff on sidewall, etc.). If pulling trailer, sketch type of trailer and damage received on the back of this page.

Annotate any damage caused by extrication such as component removal by torching, prying, or hydraulic shears.



## CDC WORKSHEET

## CODES FOR OBJECT CONTACTED

01-30 – Vehicle Number

Noncollision

(31) Overturn – rollover

(32) Fire or explosion

(33) Jackknife

(34) Other intraunit damage (specify):  
\_\_\_\_\_

(35) Noncollision injury

(38) Other noncollision (specify):  
\_\_\_\_\_

(39) Noncollision – details unknown

Collision with Fixed Object

(41) Tree ( $\leq 4$  inches in diameter)(42) Tree ( $> 4$  inches in diameter)

(43) Shrubbery or bush

(44) Embankment

(45) Breakaway pole or post (any diameter)

Nonbreakaway Pole or Post

(50) Pole or post ( $\leq 4$  inches in diameter)(51) Pole or post ( $> 4$  but  $\leq 12$  inches in diameter)(52) Pole or post ( $> 12$  inches in diameter)

(53) Pole or post (diameter unknown)

(54) Concrete traffic barrier

(55) Impact attenuator

(56) Other traffic barrier (specify):  
W-BEAM GUARDRAIL

(57) Fence

(58) Wall

(59) Building

(60) Ditch or Culvert

(61) Ground

(62) Fire hydrant

(63) Curb

(64) Bridge

(68) Other fixed object (specify):  
\_\_\_\_\_

(69) Unknown fixed object

Collision With Nonfixed Object

(71) Motor vehicle not in transport

(72) Pedestrian

(73) Cyclist or cycle

(74) Other nonmotorist or conveyance (specify):  
\_\_\_\_\_

(75) Vehicle occupant

(76) Animal

(77) Train

(78) Trailer, disconnected in transport

(88) Other nonfixed object (specify):  
\_\_\_\_\_

(89) Unknown nonfixed object

(98) Other event (specify):  
\_\_\_\_\_

(99) Unknown event or object

## DEFORMATION CLASSIFICATION BY EVENT NUMBER

Accident Event Sequence Number	Object Contacted	(1) (2) Direction of Force (degrees)	Incremental Value of Shift	(3) Deformation Location	(4) Specific Longitudinal or Lateral Location	(5) Specific Vertical or Lateral Location	(6) Type of Damage Distribution	(7) Deformation Extent
<u>01</u>	<u>63</u>	<u>025</u>	<u>00</u>	<u>R</u>	<u>R</u>	<u>W</u>	<u>N</u>	<u>02</u>
<u>02</u>	<u>56</u>	<u>060</u>	<u>00</u>	<u>F</u>	<u>D</u>	<u>E</u>	<u>W</u>	<u>01</u>
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

**COLLISION DEFORMATION CLASSIFICATION****HIGHEST DELTA "V"**

Accident Event Sequence Number	Object Contacted	(1) (2) Direction of Force	(3) Deformation Location	(4) Specific Longitudinal or Lateral Location	(5) Specific Vertical or Lateral Location	(6) Type of Damage Distribution	(7) Deformation Extent
4. <u>02</u>	5. <u>56</u>	6. <u>02</u>	7. <u>F</u>	8. <u>D</u>	9. <u>E</u>	10. <u>W</u>	11. <u>01</u>

**Second Highest Delta "V"**

12. <u>01</u>	13. <u>63</u>	14. <u>01</u>	15. <u>R</u>	16. <u>B</u>	17. <u>W</u>	18. <u>N</u>	19. <u>02</u>
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**CRUSH PROFILE**

(The crush profile for the damage described in the CDC(s) above should be documented in the appropriate space below. ALL MEASUREMENTS ARE IN INCHES.)

**HIGHEST DELTA "V"**

20. L	21. C1	C2	C3	C4	C5	C6	22. + - D
<u>054</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>02</u>	<u>01</u>	<u>01</u>	<u>000</u>

**Second Highest Delta "V"**

23. L	24. C1	C2	C3	C4	C5	C6	25. + - D

26. Are CDCs Documented  
but Not Coded on The  
Automated File

(0) No  
(1) Yes

1

27. Researcher's Assessment  
of Vehicle Disposition

(0) Not towed due to  
vehicle damage  
(1) Towed due to  
vehicle damage  
(9) Unknown

1

28. Original Wheelbase

Code to the  
nearest  
tenth of an inch  
(9999) Unknown

096.5

\*\*\* STOP: IF THE CDS APPLICABLE VEHICLE WAS NOT TOWED \*\*\*  
(I.E., GV09 = 0 OR 9), DO NOT COMPLETE THE INTERIOR VEHICLE FORM.



U.S. Department of Transportation  
National Highway Traffic Safety  
Administration

# INTERIOR VEHICLE FORM

NATIONAL ACCIDENT SAMPLING SYSTEM  
CRASHWORTHINESS DATA SYSTEM

1. Primary Sampling Unit Number

2. Case Number ~~Stratum~~

3. Vehicle Number

## INTEGRITY

4. Passenger Compartment Integrity

(00) No integrity loss

Yes, Integrity Was Lost Through

(01) Windshield

(02) Door (side)

(03) Door/hatch (rear)

(04) Roof

(05) Roof glass

(06) Side window

(07) Rear window

(08) Roof and roof glass

(09) Windshield and door (side)

(10) Windshield and roof

(11) Side and rear window

(12) Windshield and side window

(13) Door and side window

(98) Other combination of above (specify):

(99) Unknown

## Door, Tailgate Or Hatch Opening

5. LF 1 6. RF 1 7. LR 0 8. RR 0 9. TG/H 1

(0) No door/gate/hatch

(1) Door/gate/hatch remained closed and operational

(2) Door/gate/hatch came open during collision

(3) Door/gate/hatch jammed shut

(8) Other (specify):

(9) Unknown

## Damage/Failure Associated with Door, Tailgate or Hatch Opening in Collision. If IV05-IV09 ≠ 2, Then Code 0.

10. LF 1 11. RF 1 12. LR 0 13. RR 0 14. TG/H 1

(0) No door/gate/hatch or door not opened

Door, Tailgate, or Hatch Came Open During Collision

(1) Door operational (no damage)

(2) Latch/striker failure due to damage

(3) Hinge failure due to damage

(4) Door structure failure due to damage

(5) Door support (i.e., pillar, sill, roof side rail, etc.) failure due to damage

(6) Latch/striker and hinge failure due to damage

(8) Other failure (specify):

(9) Unknown

## GLAZING

Glazing Damage from Impact Forces

15. WS 0 16. LF 0 17. RF 0 18. LR 0 19. RR 0

20. BL 0 21. Roof 8 22. Other 8

(0) No glazing damage from impact forces

(2) Glazing in place and cracked from impact forces

(3) Glazing in place and holed from impact forces

(4) Glazing out-of-place (cracked or not) and not holed from impact forces

(5) Glazing out-of-place and holed from impact forces

(6) Glazing disintegrated from impact forces

(7) Glazing removed prior to accident

(8) No glazing

(9) Unknown if damaged

## Glazing Damage from Occupant Contact

23. WS 0 24. LF 0 25. RF 0 26. LR 0 27. RR 0

28. BL 0 29. Roof 0 30. Other 0

(0) No occupant contact to glazing or no glazing

(1) Glazing contacted by occupant but no glazing damage

(2) Glazing in place and cracked by occupant contact

(3) Glazing in place and holed by occupant contact

(4) Glazing out-of-place (cracked or not) by occupant contact and not holed by occupant contact

(5) Glazing out-of-place by occupant contact and holed by occupant contact

(6) Glazing disintegrated by occupant contact

(9) Unknown if contacted by occupant

If No Glazing Damage **And** No Occupant Contact or No Glazing, Then Code IV 31 Through IV 46 As 0

## Type of Window/Windshield Glazing

31. WS 1 32. LF 2 33. RF 2 34. LR 2 35. RR 2

36. BL 2 37. Roof 0 38. Other 0

(0) No glazing contact and no damage, or no glazing

(1) AS-1 - Laminated

(2) AS-2 - Tempered

(3) AS-3 - Tempered-tinted

(4) AS-14 - Glass/Plastic

(8) Other (specify):

(9) Unknown

## Window Precrash Glazing Status

39. WS 1 40. LF 2 41. RF 2 42. LR 0 43. RR 0

44. BL 0 45. Roof 0 46. Other 0

(0) No glazing contact and no damage, or no glazing

(1) Fixed

(2) Closed

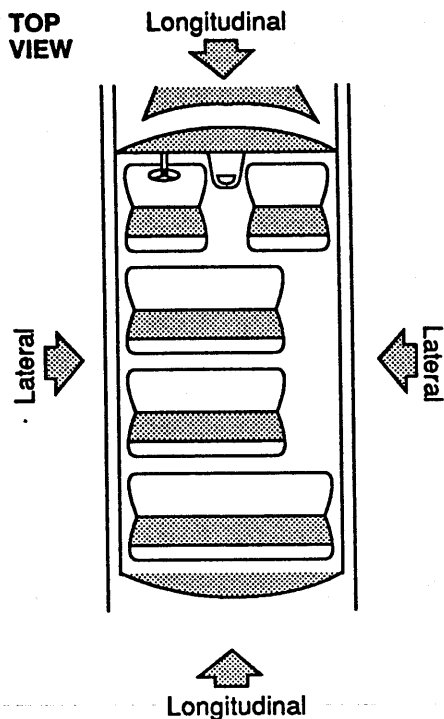
(3) Partially opened

(4) Fully opened

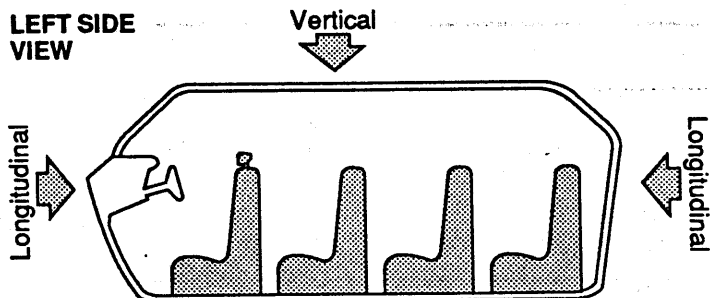
(9) Unknown

# INTRUSION WORK SHEET

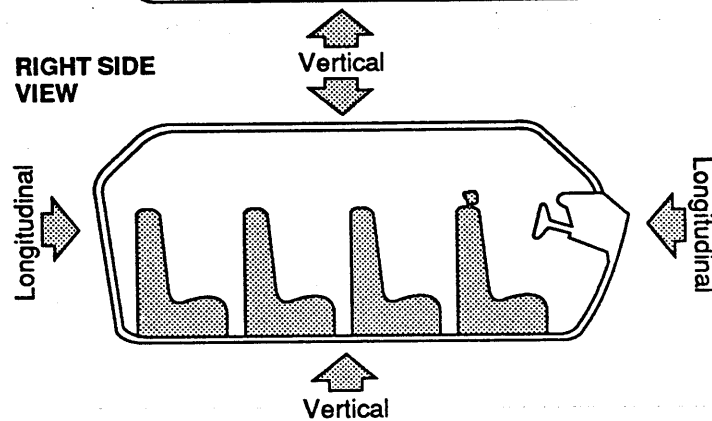
TOP  
VIEW



LEFT SIDE  
VIEW



RIGHT SIDE  
VIEW



Note: Sketch intruded areas

NO INTRUSION

LOCATION OF INTRUSION	INTRUDED COMPONENT	COMPARISON VALUE	-	INTRUDED VALUE	=	INTRUSION	DOMINANT CRUSH DIRECTION
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		
			-		=		

Document no more than the 15 most severe intrusions

## OCCUPANT AREA INTRUSION

Note: If no intrusions, leave variables IV 47-IV 86 blank.

## INTRUDING COMPONENT

## Interior Components

- (01) Steering assembly
- (02) Instrument panel left
- (03) Instrument panel center
- (04) Instrument panel right
- (05) Toe pan
- (06) A-pillar
- (07) B-pillar
- (08) C-pillar
- (09) D-pillar
- (10) Door panel
- (12) Roof (or convertible top)
- (13) Roof side rail
- (14) Windshield
- (15) Windshield header
- (16) Window frame
- (17) Floor pan
- (18) Backlight header
- (19) Front seat back
- (20) Second seat back
- (21) Third seat back
- (22) Fourth seat back
- (23) Fifth seat back
- (24) Seat cushion
- (25) Back panel or door surface
- (26) Other interior component (specify): \_\_\_\_\_

- (27) Side panel - forward of the A-pillar
- (28) Side panel - rear of the A-pillar

## Exterior Components

- (30) Hood
- (31) Outside surface of vehicle (specify): \_\_\_\_\_
- (32) Other exterior object in the environment (specify): \_\_\_\_\_
- (33) Unknown exterior object
- (97) Catastrophic
- (98) Intrusion of unlisted component(s) (specify): \_\_\_\_\_
- (99) Unknown

## MAGNITUDE OF INTRUSION

- (1)  $\geq 1$  inch but  $< 3$  inches
- (2)  $\geq 3$  inches but  $< 6$  inches
- (3)  $\geq 6$  inches but  $< 12$  inches
- (4)  $\geq 12$  inches but  $< 18$  inches
- (5)  $\geq 18$  inches but  $< 24$  inches
- (6)  $\geq 24$  inches
- (7) Catastrophic
- (9) Unknown

## DOMINANT CRUSH DIRECTION

- (1) Vertical
- (2) Longitudinal
- (3) Lateral
- (7) Catastrophic
- (9) Unknown

Location of Intrusion	Intruding Component	Magnitude of Intrusion	Dominant Crush Direction
1st 47. _____	48. _____	49. _____	50. _____
2nd 51. _____	52. _____	53. _____	54. _____
3rd 55. _____	56. _____	57. _____	58. _____
4th 59. _____	60. _____	61. _____	62. _____
5th 63. _____	64. _____	65. _____	66. _____
6th 67. _____	68. _____	69. _____	70. _____
7th 71. _____	72. _____	73. _____	74. _____
8th 75. _____	76. _____	77. _____	78. _____
9th 79. _____	80. _____	81. _____	82. _____
10th 83. _____	84. _____	85. _____	86. _____

LOCATION OF INTRUSION NO INTRUSION

## Front Seat

- (11) Left
- (12) Middle
- (13) Right

## Fourth Seat

- (41) Left
- (42) Middle
- (43) Right

## Second Seat

- (21) Left
- (22) Middle
- (23) Right

- (97) Catastrophic
- (98) Other enclosed area (specify): \_\_\_\_\_

## Third Seat

- (31) Left
- (32) Middle
- (33) Right

- (99) Unknown

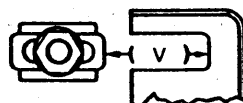
# STEERING COLUMN WORKING DIAGRAMS

## STEERING COLUMN COLLAPSE

### Steering Column Shear Module Movement

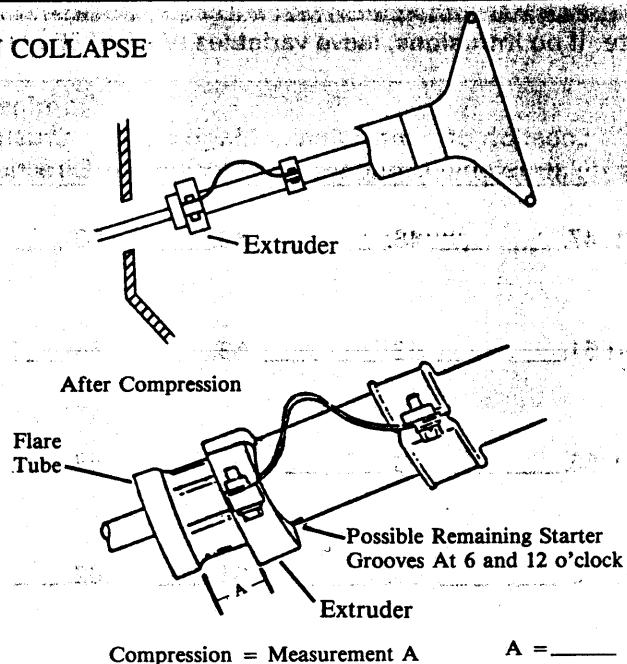


Left \_\_\_\_



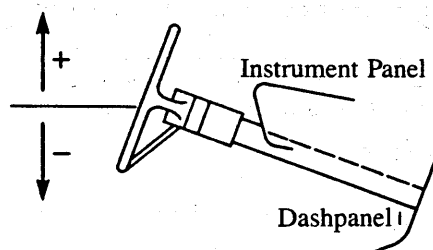
Right \_\_\_\_ V = \_\_\_\_"

Direction and Magnitude of Steering Column Movement

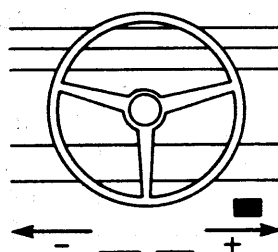


## STEERING COLUMN MOVEMENT

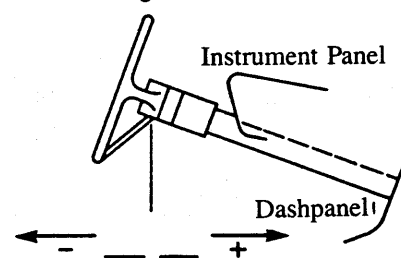
### Vertical Movement



### Lateral Movement



### Longitudinal Movement



	COMPARISON VALUE	-	DAMAGED VALUE	=	MOVEMENT
VERTICAL		-		=	
LATERAL		-		=	
LONGITUDINAL		-		=	

## STEERING RIM/SPOKE DEFORMATION

COMPARISON VALUE	-	DAMAGED VALUE	=	DEFORMATION
	-		=	
	-		=	



**STEERING COLUMN****87. Steering Column Type**

- (1) Fixed column  
 (2) Tilt column  
 (3) Telescoping column  
 (4) Tilt and telescoping column  
 (8) Other column type (specify): \_\_\_\_\_

(9) Unknown

If PDOF  $\neq$  11, 12 or 1, Then Code IV88-IV91 As 96

**88. Steering Column Collapse Due to Occupant Loading**

\_\_\_\_\_ Code actual measured movement to the nearest inch. See coding manual for measurement technique(s).

- (00) No movement, compression, or collapse  
 (01-19) Actual measured value  
 (20) 20 inches or greater

Estimated movement from observation

- (81) Less than 1 inch  
 (82)  $\geq$  1 inch but  $<$  2 inches  
 (83)  $\geq$  2 inches but  $<$  4 inches  
 (84)  $\geq$  4 inches but  $<$  6 inches  
 (85)  $\geq$  6 inches but  $<$  8 inches  
 (86) Greater than or equal to 8 inches  
 (96) Not assessed (PDOF  $\neq$  11, 12, 1)  
 (97) Apparent movement, value undetermined or cannot be measured or estimated  
 (98) Nonspecified type column  
 (99) Unknown

**Direction And Magnitude of Steering Column Movement****89. Vertical Movement**

$\oplus$  0 0

**90. Lateral Movement**

+ 0 0

**91. Longitudinal Movement**

+ 0 0

Code the actual measured movement to the nearest inch. See Coding Manual for measurement technique(s)

- (00) No steering column movement  
 ( $\pm$  01 –  $\pm$  49) Actual measured value  
 ( $\pm$  50) 50 inches or greater

Estimated movement from observation

- ( $\pm$  81)  $\geq$  1 inch but  $<$  3 inches  
 ( $\pm$  82)  $\geq$  3 inches but  $<$  6 inches  
 ( $\pm$  83)  $\geq$  6 inches but  $<$  12 inches  
 ( $\pm$  84)  $\geq$  12 inches  
 (\_\_\_ 96) Not assessed (PDOF  $\neq$  11, 12, 1)  
 (\_\_\_ 97) Apparent movement  $>$  1 inch but cannot be measured or estimated  
 (\_\_\_ 99) Unknown

**92. Steering Rim/Spoke Deformation**

\_\_\_\_\_ Code actual measured deformation to the nearest inch.

- (0) No steering rim deformation  
 (1-5) Actual measured value  
 (6) 6 inches or more  
 (8) Observed deformation cannot be measured  
 (9) Unknown

**93. Location of Steering Rim/Spoke Deformation**

(00) No steering rim deformation

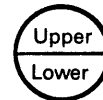
Quarter Sections

- (01) Section A  
 (02) Section B  
 (03) Section C  
 (04) Section D



Half Sections

- (05) Upper half of rim/spoke  
 (06) Lower half of rim/spoke  
 (07) Left half of rim/spoke  
 (08) Right half of rim/spoke



- (09) Complete steering wheel collapse  
 (10) Undetermined location  
 (99) Unknown

**INSTRUMENT PANEL****94. Odometer Reading**

4945 miles – Code mileage to the nearest 1,000 miles

- (000) No odometer  
 (001) Less than 1,500 miles  
 (300) 299,500 miles or more  
 (999) Unknown

Source: \_\_\_\_\_

**95. Instrument Panel Damage from Occupant Contact?**

- (0) No  
 (1) Yes  
 (9) Unknown

**96. Knee Bolsters Deformed from Occupant Contact?**

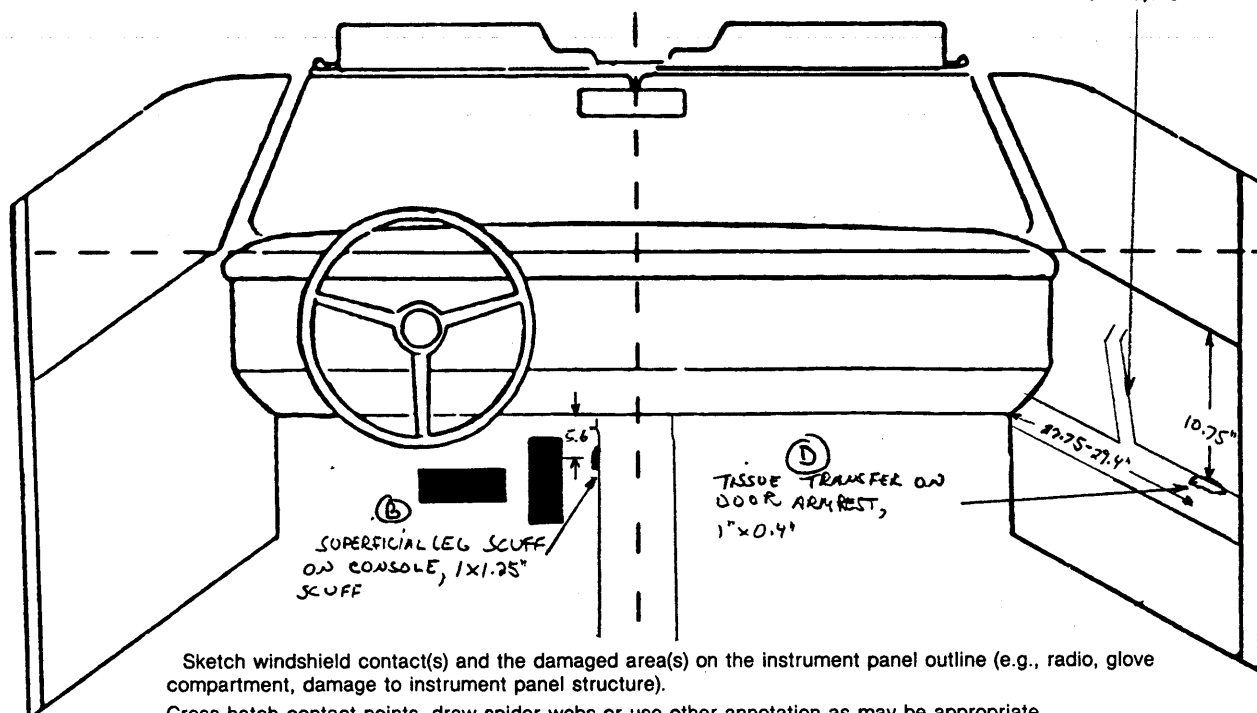
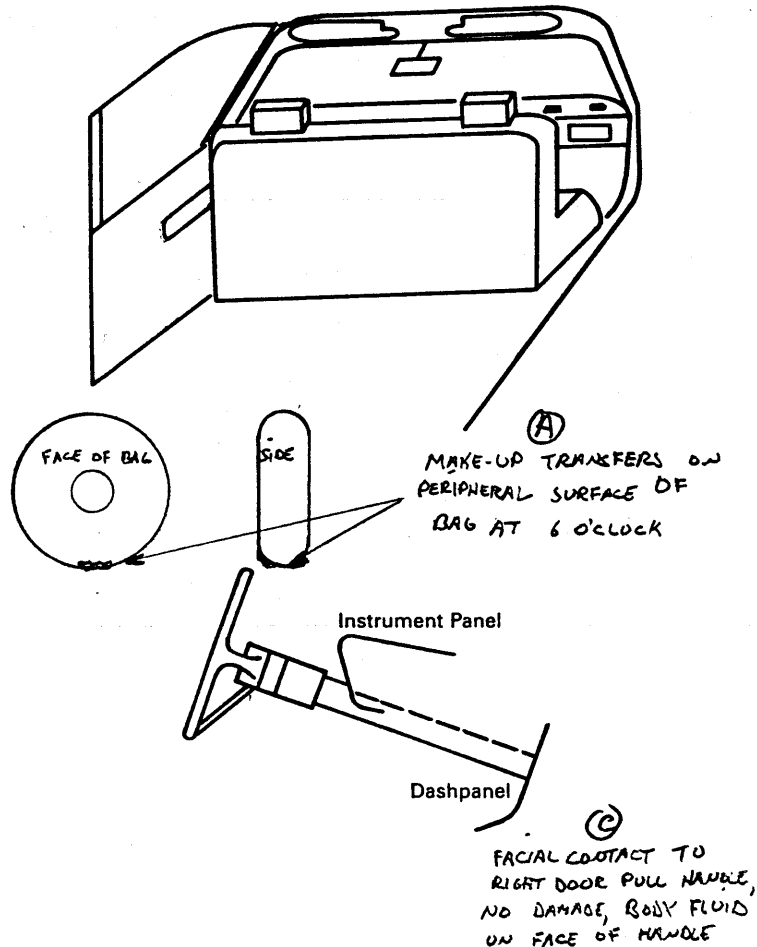
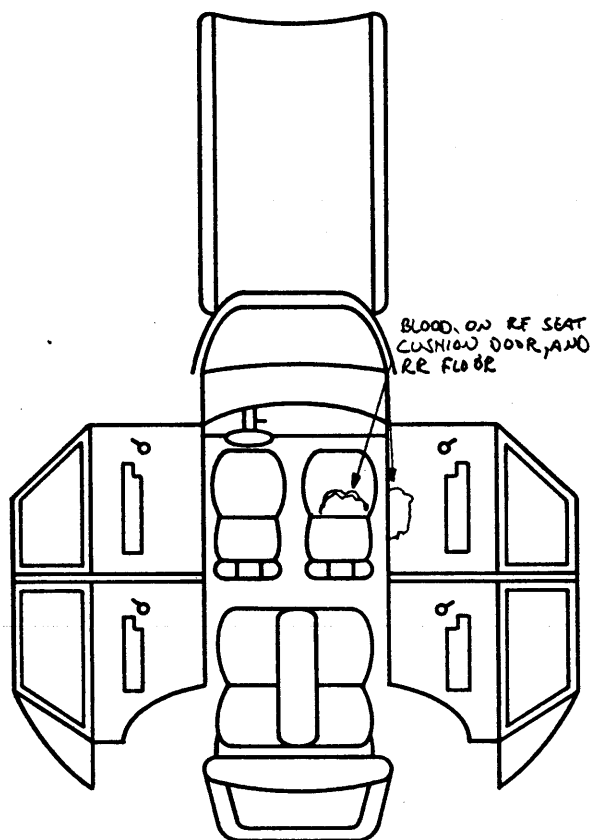
- (0) No  
 (1) Yes  
 (8) Not present  
 (9) Unknown

**97. Did Glove Compartment Door Open During Collision(s)?**

- (0) No  
 (1) Yes  
 (8) Not present  
 (9) Unknown

## VEHICLE INTERIOR SKETCHES

Note area of ejection/entrapment



Sketch windshield contact(s) and the damaged area(s) on the instrument panel outline (e.g., radio, glove compartment, damage to instrument panel structure).

Cross hatch contact points, draw spider webs or use other annotation as may be appropriate.

Annotate the contacted area with a letter (begin with A) and list on the Points of Occupant Contact page.

## POINTS OF OCCUPANT CONTACT

Contact	Interior Component Contacted	Occupant No. If Known	Body Region If Known	Supporting Physical Evidence	Confidence Level of Contact Point
A	45	1	FACE	MAKE-UP TRANSFERS	1
B	57	1	LEG	SCUFF	1
C	31	1	FACE	BODY FLUIDS / INJURY	1
D	31	1	NECK/CHEST	TISSUE TRANSFER	1
E					
F					
G					
H					
I					
J					
K					
L					
M					
N					

## CODES FOR INTERIOR COMPONENTS

## FRONT

- (01) Windshield
- (02) Mirror
- (03) Sunvisor
- (04) Steering wheel rim
- (05) Steering wheel hub/spoke
- (06) Steering wheel (combination of codes 04 and 05)
- (07) Steering column, transmission selector lever, other attachment
- (08) Add on equipment (e.g., CB, tape deck, air conditioner)
- (09) Left instrument panel and below
- (10) Center instrument panel and below
- (11) Right instrument panel and below
- (12) Glove compartment door
- (13) Knee bolster
- (14) Windshield including one or more of the following: front header, A-pillar, instrument panel, mirror, or steering assembly (driver side only)
- (15) Windshield including one or more of the following: front header, A-pillar, instrument panel, or mirror (passenger side only)
- (16) Other front object (specify):

## LEFT SIDE

- (20) Left side interior surface, excluding hardware or armrests
- (21) Left side hardware or armrest
- (22) Left A pillar
- (23) Left B pillar
- (24) Other left pillar (specify):
- (25) Left side window glass or frame

- (26) Left side window glass including one or more of the following: frame, window sill, A-pillar, B-pillar, or roof side rail
- (27) Other left side object (specify):

## RIGHT SIDE

- (30) Right side interior surface, excluding hardware or armrests
- (31) Right side hardware or armrest
- (32) Right A pillar
- (33) Right B pillar
- (34) Other right pillar (specify):
- (35) Right side window glass or frame
- (36) Right side window glass including one or more of the following: frame, window sill, A-pillar, B-pillar, or roof side rail
- (37) Other right side object (specify):

## INTERIOR

- (40) Seat, back support
- (41) Belt restraint webbing/buckle
- (42) Belt restraint B-pillar attachment point
- (43) Other restraint system component (specify):
- (44) Head restraint system
- (45) Air bag
- (46) Other occupants (specify):
- (47) Interior loose objects

- (48) Child safety seat (specify):

- (49) Other interior object (specify):

## ROOF

- (50) Front header
- (51) Rear header
- (52) Roof left side rail
- (53) Roof right side rail
- (54) Roof or convertible top

## FLOOR

- (56) Floor including toe pan
- (57) Floor or console mounted transmission lever, including console
- (58) Parking brake handle
- (59) Foot controls including parking brake

## REAR

- (60) Backlight (rear window)
- (61) Backlight storage rack, door, etc.
- (62) Other rear object (specify):

## CONFIDENCE LEVEL OF CONTACT POINT

- (1) Certain
- (2) Probable
- (3) Possible
- (4) Unknown

## AUTOMATIC RESTRAINTS

**NOTES:** Encode the data for each applicable front seat position. The attributes for the variables may be found below. Restraint systems should be assessed during the vehicle inspection then coded on the Occupant Assessment Form.

		Left	Center	Right
F I R S T	Availability	1	-	-
	Function	4	-	-
	Failure	1	-	-

### Automatic (Passive) Restraint System Availability

- (0) Not equipped/not available
- (1) Airbag
- (2) Airbag disconnected (specify): \_\_\_\_\_
- (3) Airbag not reinstalled
- (4) 2 point automatic belts
- (5) 3 point automatic belts
- (6) Automatic belts destroyed or rendered inoperative
- (9) Unknown

### Automatic (Passive) Restraint Function

- (0) Not equipped/not available

#### Automatic Belt

- (1) Automatic belt in use
- (2) Automatic belt not in use
- (3) Automatic belt use unknown

#### Air Bag

- (4) Airbag deployed during accident
- (5) Airbag deployed inadvertently just prior to accident
- (6) Deployed, accident sequence undetermined
- (7) Nondeployed
- (8) Unknown if deployed
- (9) Unknown

### Did Automatic (Passive) Restraint Fail

- (0) Not equipped/not available
- (1) No
- (2) Yes (specify): \_\_\_\_\_
- (9) Unknown

**MANUAL RESTRAINTS**

**NOTES:** Encode the applicable data for each seat position in the vehicle. The attributes for the variables may be found below. Restraint systems should be assessed during the vehicle inspection then coded on the Occupant Assessment Form.

If a child safety seat is present, encode the data on the back of this page.

If the vehicle has automatic restraints available, encode the appropriate data on the back of the previous page.

		Left	Center	Right
<b>F I R S T</b>	Availability	4	-	4
	Use	00	-	-
	Failure Modes	0	-	0
<b>S E C O N D</b>	Availability	4	-	4
	Use	-	-	-
	Failure Modes	-	-	-
<b>T H I R D</b>	Availability			
	Use			
	Failure Modes			
<b>O T H E R</b>	Availability			
	Use			
	Failure Modes			

**Manual (Active) Belt System Availability**

- (0) Not available
- (1) Belt removed/destroyed
- (2) Shoulder belt
- (3) Lap belt
- (4) Lap and shoulder belt
- (5) Belt available — type unknown
- (8) Other belt (specify):

(9) Unknown

**Manual (Active) Belt System Use**

- (00) None used, not available, or belt removed/destroyed
- (01) Inoperative (specify):

- (02) Shoulder belt
- (03) Lap belt
- (04) Lap and shoulder belt
- (05) Belt used — type unknown

(08) Other belt used (specify):

- (12) Shoulder belt used with child safety seat
- (13) Lap belt used with child safety seat
- (14) Lap and shoulder belt used with child safety seat
- (15) Belt used with child safety seat — type unknown
- (18) Other belt used with child safety seat (specify):

(99) Unknown if belt used

**Manual (Active) Belt Failure Modes During Accident**

- (0) No manual belt used or not available
- (1) No manual belt failure(s)
- (2) Torn webbing (stretched webbing not included)
- (3) Broken buckle or latchplate
- (4) Upper anchorage separated
- (5) Other anchorage separated (specify):

- (6) Broken retractor
- (7) Combination of above (specify):

(8) Other manual belt failure (specify):

(9) Unknown

# CHILD SAFETY SEAT FIELD ASSESSMENT

When a child safety seat is present enter the occupant's number in the first row and complete the column below the occupant's number using the codes listed below. Complete a column for each child safety seat present.

Occupant Number						
1. Type of Child Safety Seat						
2. Child Safety Seat Orientation						
3. Child Safety Seat Harness Usage						
4. Child Safety Seat Shield Usage						
5. Child Safety Seat Tether Usage						
6. Child Safety Seat Make/Model	Specify Below for Each Child Safety Seat					

## 1. Type of Child Safety Seat

- (0) No child safety seat
- (1) Infant seat
- (2) Toddler seat
- (3) Convertible seat
- (4) Booster seat
- (7) Other type child safety seat (specify):

- (8) Unknown child safety seat type
- (9) Unknown if child safety seat used

## 2. Child Safety Seat Orientation

- (00) No child safety seat
- Designed for Rear Facing for This Age/Weight
- (01) Rear facing
- (02) Forward facing
- (03) Other orientation (specify):
- (04) Unknown orientation
- Designed for Forward Facing for This Age/Weight
- (11) Rear facing
- (12) Forward facing
- (18) Other orientation (specify):
- (19) Unknown orientation
- Unknown Design or Orientation for This Age/Weight, or Unknown Age/Weight
- (21) Rear facing
- (22) Forward facing
- (28) Other orientation (specify):
- (29) Unknown orientation
- (99) Unknown if child safety seat used

## 3. Child Safety Seat Harness Usage

## 4. Child Safety Seat Shield Usage

## 5. Child Safety Seat Tether Usage

Note: Options Below Are Used for Variables 3-5.

- (00) No child safety seat
- Not Designed with Harness/Shield/Tether
- (01) After market harness/shield/tether added, not used
- (02) After market harness/shield/tether used
- (03) Child safety seat used, but no after market harness/shield/tether added
- (09) Unknown if harness/shield/tether added or used
- Designed with Harness/Shield/Tether
- (11) Harness/shield/tether not used
- (12) Harness/shield/tether used
- (19) Unknown if harness/shield/tether used
- Unknown if Designed with Harness/Shield/Tether
- (21) Harness/shield/tether not used
- (22) Harness/shield/tether used
- (29) Unknown if harness/shield/tether used
- (99) Unknown if child safety seat used

## 6. Child Safety Seat Make/Model

(Specify make/model and occupant number)

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**HEAD RESTRAINTS/SEAT EVALUATION**

NOTES: Encode the applicable data for **each seat position** in the vehicle. The attributes for these variables may be found at the bottom of the page. Head restraint type/damage and seat type/performance should be assessed during the vehicle inspection then coded on the Occupant Assessment Form.

		Left	Center	Right
F I R S T	Head Restraint Type/Damage		-	
	Seat Type	01	-	01
	Seat Performance	1	-	1
S E C O N D	Head Restraint Type/Damage	0	-	0
	Seat Type			
	Seat Performance			
T H I R D	Head Restraint Type/Damage			
	Seat Type			
	Seat Performance			
O T H E R	Head Restraint Type/Damage			
	Seat Type			
	Seat Performance			

**Head Restraint Type/Damage by Occupant at This Occupant Position**

- (0) No head restraints
- (1) Integral – no damage
- (2) Integral – damaged during accident
- (3) Adjustable – no damage
- (4) Adjustable – damaged during accident
- (5) Add-on – no damage
- (6) Add-on – damaged during accident
- (8) Other (specify): \_\_\_\_\_
- (9) Unknown

**Seat Type (This Occupant Position)**

- (00) No seat
- (01) Bucket
- (02) Bucket with folding back
- (03) Bench
- (04) Bench with separate back cushions
- (05) Bench with folding back(s)
- (06) Split bench with separate back cushions
- (07) Split bench with folding back(s)
- (08) Pedestal (i.e., van type)
- (09) Other seat type (specify): \_\_\_\_\_
- (99) Unknown

**Seat Performance (This Occupant Position)**

- (0) No seat
- (1) No seat performance failure(s)
- (2) Seat adjusters failed
- (3) Seat back folding locks failed
- (4) Seat tracks/anchors failed
- (5) Deformed by impact of occupant
- (6) Deformed by passenger compartment intrusion (specify): \_\_\_\_\_

- (7) Combination of above (specify): \_\_\_\_\_
- (8) Other (specify): \_\_\_\_\_

- (9) Unknown

**DESCRIBE ANY INDICATION OF ABNORMAL OCCUPANT POSTURE (I.E. UNUSUAL OCCUPANT CONTACT PATTERN)**

**EJECTION/ENTRAPMENT DATA**

Complete the following if the researcher has any indications that an occupant was either ejected from or entrapped in the vehicle. Code the appropriate data on the Occupant Assessment Form.

**EJECTION**      No ☒ Yes [   ]

Describe indications of ejection and body parts involved in partial ejection(s):

Occupant Number						
Ejection						
(Note on Vehicle Interior Sketch) Ejection Area						
Ejection Medium						
Medium Status						

**Ejection**

- (1) Complete ejection
- (2) Partial ejection
- (3) Ejection, unknown degree
- (9) Unknown

**Ejection Area**

- (1) Windshield
- (2) Left front
- (3) Right front
- (4) Left rear
- (5) Right rear
- (6) Rear

## (7) Roof

- (8) Other area (e.g., back of pickup, etc.) (specify):

## (9) Unknown

**Ejection Medium**

- (1) Door/hatch/tailgate
- (2) Nonfixed roof structure
- (3) Fixed glazing
- (4) Nonfixed glazing (specify):

## (5) Integral structure

- (8) Other medium (specify):

## (9) Unknown

**Medium Status (Immediately Prior to Impact)**

- (1) Open
- (2) Closed
- (3) Integral structure
- (9) Unknown

**ENTRAPMENT**      No ☒ Yes [   ]

Describe entrapment mechanism: \_\_\_\_\_

Component(s): \_\_\_\_\_

(Note in vehicle interior diagram)

## **APPENDIX C**

### **NASS Occupant Forms**



## OCCUPANT ASSESSMENT FORM

<p>1. <del>Primary Sampling Unit Number</del> _____</p> <p>2. Case Number — <del>Stratum</del> <u>91-03</u></p> <p>3. Vehicle Number <u>01</u></p> <p>4. Occupant Number <u>01</u></p> <p style="text-align: center;"><b>OCCUPANT'S CHARACTERISTICS</b></p> <p>5. Occupant's Age <u>42</u> Code actual age at time of accident. (00) Less than one year old (specify by month): _____ (97) 97 years and older (99) Unknown</p> <p>6. Occupant's Sex <u>2</u> (1) Male (2) Female (9) Unknown</p> <p>7. Occupant's Height <u>61</u> Code actual height to the nearest inch. (99) Unknown</p> <p>8. Occupant's Weight <u>90-100 LBS</u> <u>095</u> Code actual weight to the nearest pound. (999) Unknown</p> <p>9. Occupant's Role <u>1</u> (1) Driver (2) Passenger (9) Unknown</p> <p>10. Occupant's Seat Position <u>11</u> Front Seat (11) Left side (12) Middle (13) Right side (14) Other (specify): _____ Second Seat (21) Left side (22) Middle (23) Right side (24) Other (specify): _____ Third Seat (31) Left side (32) Middle (33) Right side (34) Other (specify): _____ Fourth Seat (41) Left side (42) Middle (43) Right side (44) Other (specify): _____ (97) In or on unenclosed area (98) Other seat (specify): _____ (99) Unknown</p>	<p>11. Occupant's Posture <u>0</u> (0) Normal posture (1) Abnormal posture (specify): _____ (9) Unknown</p> <p style="text-align: center;"><b>EJECTION/ENTRAPMENT</b></p> <p>12. Ejection <u>0</u> (0) No ejection (1) Complete ejection (2) Partial ejection (3) Ejection, unknown degree (9) Unknown</p> <p>13. Ejection Area <u>0</u> (0) No ejection (1) Windshield (2) Left front (3) Right front (4) Left rear (5) Right rear (6) Rear (7) Roof (8) Other area (e.g., back of pickup, etc.) (specify): _____ (9) Unknown</p> <p>14. Ejection Medium <u>0</u> (0) No ejection (1) Door/hatch/tailgate (2) Nonfixed roof structure (3) Fixed glazing (4) Nonfixed glazing (specify): _____ (5) Integral structure (8) Other medium (specify): _____ (9) Unknown</p> <p>15. Medium Status (Immediately Prior to Impact) <u>0</u> (0) No ejection (1) Open (2) Closed (3) Integral structure (9) Unknown</p> <p>16. Entrapment <u>0</u> (NOTE: Entrapped means that part of the person was in the vehicle and mechanically restrained; jammed doors and immobilizing injuries by themselves are not sufficient to constitute entrapment.) (0) Not entrapped (1) Entrapped (9) Unknown</p>
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**RESTRAINT SYSTEM AND SEAT EVALUATION****17. Manual (Active) Belt System Availability** 4

- (0) Not available
- (1) Belt removed/destroyed
- (2) Shoulder belt
- (3) Lap belt
- (4) Lap and shoulder belt
- (5) Belt available—type unknown
- (8) Other belt (specify): \_\_\_\_\_

(9) Unknown

**18. Manual (Active) Belt System Use** 04

- (00) None used, not available, or belt removed/destroyed
- (01) Inoperative (specify): \_\_\_\_\_

- (02) Shoulder belt
- (03) Lap belt
- (04) Lap and shoulder belt
- (05) Belt used—type unknown
- (08) Other belt used (specify): \_\_\_\_\_

- (12) Shoulder belt used with child safety seat
- (13) Lap belt used with child safety seat
- (14) Lap and shoulder belt used with child safety seat
- (15) Belt used with child safety seat—type unknown
- (18) Other belt used with child safety seat

(specify): \_\_\_\_\_

(99) Unknown if belt used

**19. Proper Use of Manual (Active) Belts** 0

- (0) None used or not available
- (1) Belt used properly
- (2) Belt used properly with child safety seat

**Belt Used Improperly**

- (3) Shoulder belt worn under arm
- (4) Shoulder belt worn behind back or seat
- (5) Belt worn around more than one person
- (6) Lap belt worn on abdomen
- (7) Lap belt or lap and shoulder belt used improperly with child safety seat (specify): \_\_\_\_\_

- (8) Other improper use of manual belt system (specify): \_\_\_\_\_

(9) Unknown

**20. Manual (Active) Belt Failure Modes During Accident** 0

- (0) No manual belt used or not available
- (1) No manual belt failure(s)
- (2) Torn webbing (stretched webbing not included)
- (3) Broken buckle or latchplate
- (4) Upper anchorage separated
- (5) Other anchorage separated (specify): \_\_\_\_\_

- (6) Broken retractor
- (7) Combination of above (specify): \_\_\_\_\_

(8) Other manual belt failure (specify): \_\_\_\_\_

(9) Unknown

**21. Automatic (Passive) Restraint System Availability** 1

- (0) Not equipped/not available
- (1) Airbag
- (2) Airbag disconnected (specify): \_\_\_\_\_

- (3) Airbag not reinstalled
- (4) 2 point automatic belts
- (5) 3 point automatic belts
- (6) Automatic belts destroyed or rendered inoperative
- (9) Unknown

**22. Automatic (Passive) Restraint Function** 4

- (0) Not equipped/not available

**Automatic Belt**

- (1) Automatic belt in use
- (2) Automatic belt not in use
- (3) Automatic belt use unknown

**Air Bag**

- (4) Airbag deployed during accident
- (5) Airbag deployed inadvertently just prior to accident
- (6) Deployed, accident sequence undetermined
- (7) Nondeployed
- (8) Unknown if deployed
- (9) Unknown

**23. Did Automatic (Passive) Restraint Fail?** 1

- (0) Not equipped/not available
- (1) No
- (2) Yes (specify): \_\_\_\_\_

(9) Unknown

**24. Police Reported Restraint Use** 2

- (0) None used
- (1) Police did not indicate restraint use
- (2) Shoulder belt
- (3) Lap belt
- (4) Lap and shoulder belt
- (5) Belt used, type not specified
- (6) Child safety seat
- (7) Other or automatic restraint (specify): \_\_\_\_\_

AIR BAG

- (8) Restrained, type unknown
- (9) Police indicated "unknown"

**25. Head Restraint Type/Damage by Occupant at This Occupant Position** \_\_\_\_\_

- (0) No head restraints
- (1) Integral—no damage
- (2) Integral—damaged during accident
- (3) Adjustable—no damage
- (4) Adjustable—damaged during accident
- (5) Add-on—no damage
- (6) Add-on—damaged during accident
- (8) Other (specify): \_\_\_\_\_

(9) Unknown

**26. Seat Type (This Occupant Position)** 01

- (00) Occupant not seated or no seat
- (01) Bucket
- (02) Bucket with folding back
- (03) Bench
- (04) Bench with separate back cushions
- (05) Bench with folding back(s)
- (06) Split bench with separate back cushions
- (07) Split bench with folding back(s)
- (08) Pedestal (i.e., van type)
- (09) Other seat type (specify):  
\_\_\_\_\_

(99) Unknown

**27. Seat Performance (This Occupant Position)** 1

- (0) Occupant not seated or no seat
- (1) No seat performance failure(s)
- (2) Seat adjusters failed
- (3) Seat back folding locks failed
- (4) Seat track/anchors failed
- (5) Deformed by impact of occupant
- (6) Deformed by passenger compartment intrusion (specify):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(7) Combination of above (specify):  
\_\_\_\_\_(8) Other (specify):  
\_\_\_\_\_

(9) Unknown

**CHILD SAFETY SEAT****28. Child Safety Seat Make/Model** 0000

- (000) No child safety seat
- Applicable codes are found in your NASS CDS Data Collection, Coding, and Editing Manual
- (997) Other make/model (specify):  
\_\_\_\_\_

(998) Unknown make/model

(999) Unknown if child safety seat used

**29. Type of Child Safety Seat** 0

- (0) No child safety seat
- (1) Infant seat
- (2) Toddler seat
- (3) Convertible seat
- (4) Booster seat
- (7) Other type child safety seat (specify):  
\_\_\_\_\_

(8) Unknown child safety seat type

(9) Unknown if child safety seat used

**30. Child Safety Seat Orientation** 00

- (00) No child safety seat

Designed for Rear Facing for This Age/Weight

- (01) Rear facing
- (02) Forward facing
- (08) Other orientation (specify):  
\_\_\_\_\_

(09) Unknown orientation

Designed for Forward Facing for This Age/Weight

- (11) Rear facing
- (12) Forward facing
- (18) Other orientation (specify):  
\_\_\_\_\_

(19) Unknown orientation

Unknown Design or Orientation for This Age/Weight, or Unknown Age/Weight

- (21) Rear facing
- (22) Forward facing
- (28) Other orientation (specify):  
\_\_\_\_\_

(29) Unknown orientation

(99) Unknown if child safety seat used

**31. Child Safety Seat Harness Usage** 00**32. Child Safety Seat Shield Usage** 00**33. Child Safety Seat Tether Usage** 00

Note: Options below applicable to Variables OA31-OA33.

- (00) No child safety seat

Not Designed with  
Harness/Shield/Tether

- (01) After market harness/shield/tether added, not used
- (02) After market harness/shield/tether used
- (03) Child safety seat used, but no after market harness/shield/tether added
- (09) Unknown if harness/shield/tether added or used

Designed with Harness/Shield/Tether

- (11) Harness/shield/tether not used
- (12) Harness/shield/tether used
- (19) Unknown if harness/shield/tether used

Unknown If Designed with Harness/Shield/Tether

- (21) Harness/shield/tether not used
- (22) Harness/shield/tether used
- (29) Unknown if harness/shield/tether used

(99) Unknown if child safety seat used

**INJURY CONSEQUENCES****34. Injury Severity (Police Rating)**

- 4
- (0) O—No injury
  - (1) C—Possible injury
  - (2) B—Nonincapacitating injury
  - (3) A—Incapacitating injury
  - (4) K—Killed
  - (5) U—Injury, severity unknown
  - (6) Died prior to accident
  - (9) Unknown

**35. Treatment—Mortality**

- 1
- (0) No treatment
  - (1) Fatal
  - (2) Fatal—ruled disease

## Nonfatal

- (3) Hospitalized
- (4) Transported and released
- (5) Treatment at scene—nontransported
- (6) Treatment later
- (8) Treatment—other (specify):  
\_\_\_\_\_

(9) Unknown

**36. Type of Medical Facility (for Initial Treatment)**

- 0
- (0) Not treated at a medical facility
  - (1) Trauma center
  - (2) Hospital
  - (3) Medical clinic
  - (4) Physician's office
  - (5) Treatment later at medical facility
  - (8) Other (specify):  
\_\_\_\_\_

(9) Unknown

**37. Hospital stay**

- 00
- \_\_\_\_\_ Code number of days (up through 60)  
that the occupant stayed in the hospital
- (00) Not hospitalized
  - (61) 61 days or more
  - (99) Unknown

**38. Working Days Lost**

- 62
- \_\_\_\_\_ Code the number of days  
(up through 60) that the occupant  
lost from work due to the accident
- (00) No working days lost
  - (61) 61 days or more
  - (62) Fatally injured
  - (97) Not working prior to accident
  - (99) Unknown

**39. Time to Death**

- 01
- \_\_\_\_\_ Code number of hours from time of  
accident to time of death up through 24  
hours. If time of death is greater than 24  
hours, code number of days. (Note: 1 day =  
31, 2 days = 32, ... n days = 30 + n up through  
30 days = 60)
- (00) Not fatal
  - (96) Fatal—ruled disease
  - (99) Unknown

**40. 1st Medically Reported Cause of Death****41. 2nd Medically Reported Cause of Death****42. 3rd Medically Reported Cause of Death**

- \_\_\_\_\_ Code the Occupant Injury from line  
number(s) for the medically reported  
injury(s) which reportedly contributed to  
this occupant's death
- (00) Not fatal or no additional causes
  - (97) Other result (specify):  
\_\_\_\_\_

(99) Unknown

**43. Number of Recorded Injuries for  
This Occupant**

- \_\_\_\_\_ Code the actual number of  
injuries recorded for this occupant.
- (00) No recorded injuries
  - (97) Injured, details unknown
  - (99) Unknown if injured

UPDATE CANDIDATE

NO ☒YES ☐

\*\*\* STOP HERE \*\*\*

IF THERE ARE NO RECORDED INJURIES

(I.E., OA43=00, 97, 99)





# OCCUPANT INJURY FORM

1. Primary Sampling Unit Number <span style="float: right;">_____</span>	3. Vehicle Number <span style="float: right;"><u>01</u></span>
2. Case Number - Stratum <span style="float: right;"><u>91-03</u></span>	4. Occupant Number <span style="float: right;"><u>01</u></span>

## INJURY DATA

Record below the actual injuries sustained by this occupant that were identified from the official and unofficial data sources. Remember not to double count an injury just because it was identified from two different sources. If greater than ten injuries have been documented, encode the balance on the Occupant Injury Supplement.

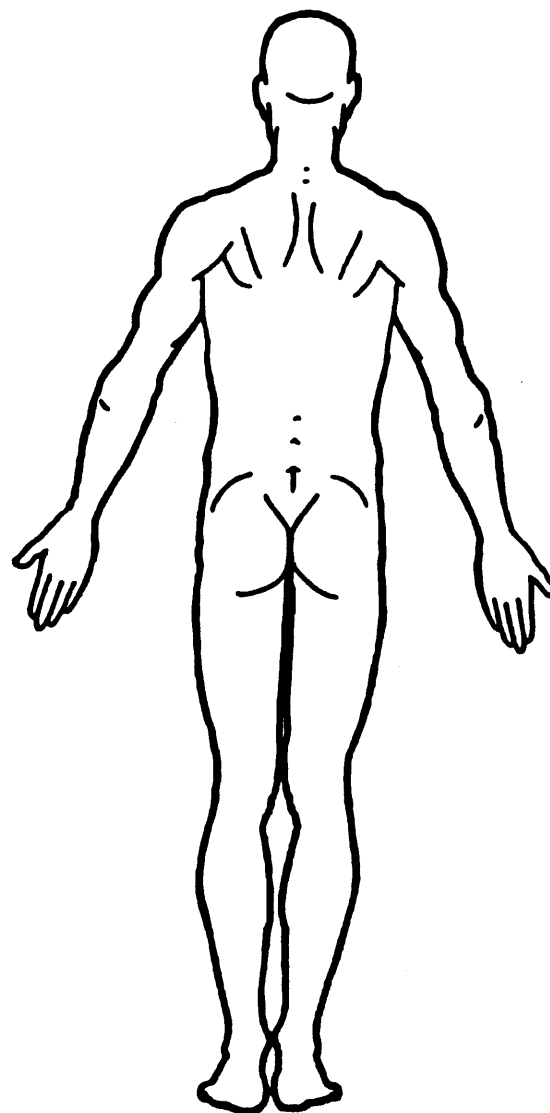
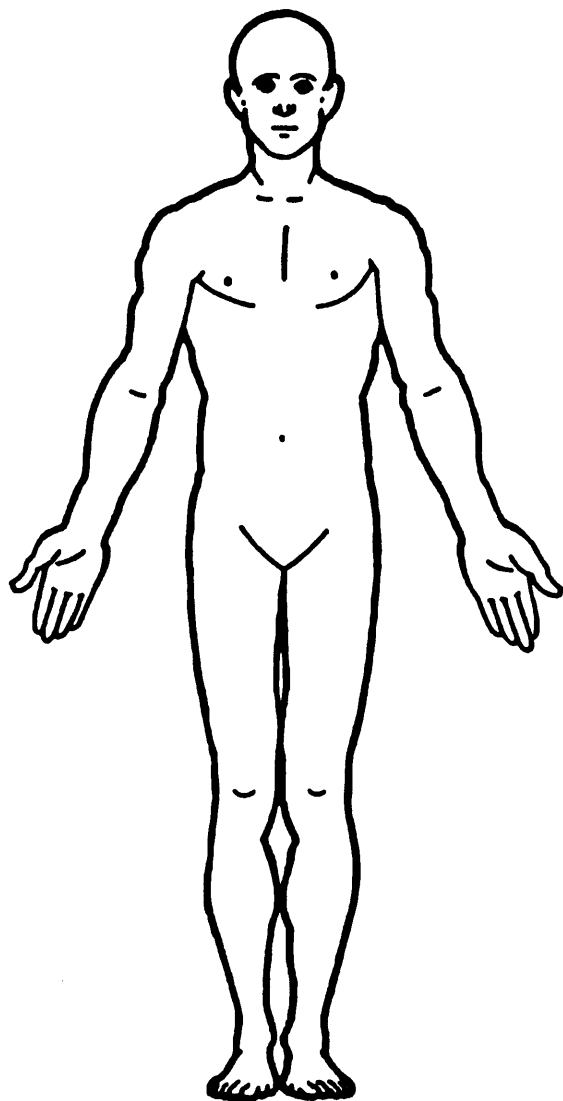
	Source of Injury Data	O.I.C.-A.I.S				Injury Source	Injury Source Confidence Level	Direct/ Indirect Injury	Occupant Area Intrusion No.	
		Body Region	Aspect	Lesion	System Organ					A.I.S. Severity
1st	5. <u>1</u>	6. <u>H</u>	7. <u>I</u>	8. <u>F</u>	9. <u>S</u>	10. <u>4</u>	11. <u>31</u>	12. <u>1</u>	13. <u>2</u>	14. <u>00</u>
2nd	15. <u>1</u>	16. <u>H</u>	17. <u>I</u>	18. <u>U</u>	19. <u>B</u>	20. <u>4</u>	21. <u>31</u>	22. <u>1</u>	23. <u>2</u>	24. <u>00</u>
3rd	25. <u>1</u>	26. <u>H</u>	27. <u>P</u>	28. <u>U</u>	29. <u>B</u>	30. <u>4</u>	31. <u>31</u>	32. <u>1</u>	33. <u>2</u>	34. <u>00</u>
4th	35. <u>1</u>	36. <u>H</u>	37. <u>I</u>	38. <u>C</u>	39. <u>B</u>	40. <u>3</u>	41. <u>31</u>	42. <u>1</u>	43. <u>2</u>	44. <u>00</u>
5th	45. <u>1</u>	46. <u>N</u>	47. <u>P</u>	48. <u>C</u>	49. <u>C</u>	50. <u>3</u>	51. <u>31</u>	52. <u>1</u>	53. <u>2</u>	54. <u>00</u>
6th	55. <u>1</u>	56. <u>N</u>	57. <u>P</u>	58. <u>F</u>	59. <u>S</u>	60. <u>2</u>	61. <u>31</u>	62. <u>1</u>	63. <u>2</u>	64. <u>00</u>
7th	65. <u>1</u>	66. <u>F</u>	67. <u>R</u>	68. <u>F</u>	69. <u>S</u>	70. <u>2</u>	71. <u>31</u>	72. <u>1</u>	73. <u>1</u>	74. <u>00</u>
8th	75. <u>1</u>	76. <u>F</u>	77. <u>I</u>	78. <u>F</u>	79. <u>S</u>	80. <u>2</u>	81. <u>31</u>	82. <u>1</u>	83. <u>1</u>	84. <u>00</u>
9th	85. <u>1</u>	86. <u>F</u>	87. <u>C</u>	88. <u>F</u>	89. <u>S</u>	90. <u>1</u>	91. <u>31</u>	92. <u>1</u>	93. <u>1</u>	94. <u>00</u>
10th	95. <u>1</u>	96. <u>N</u>	97. <u>A</u>	98. <u>C</u>	99. <u>I</u>	100. <u>1</u>	101. <u>31</u>	102. <u>1</u>	103. <u>1</u>	104. <u>00</u>

# OCCUPANT INJURY DATA

Source of Injury Data	O.I.C.-A.I.S						Injury Source	Injury Source Confidence Level	Direct/ Indirect Injury	Occupant Area Intrusion No.
	Body Region	Aspect	Lesion	System Organ	A.I.S. Severity					
11th	<u>1</u>	<u>C</u>	<u>R</u>	<u>C</u>	<u>P</u>	<u>1</u>	<u>31</u>	<u>1</u>	<u>1</u>	<u>00</u>
12th	<u>1</u>	<u>C</u>	<u>R</u>	<u>C</u>	<u>I</u>	<u>1</u>	<u>31</u>	<u>1</u>	<u>1</u>	<u>00</u>
13th	—	—	—	—	—	—	—	—	—	—
14th	—	—	—	—	—	—	—	—	—	—
15th	—	—	—	—	—	—	—	—	—	—
16th	—	—	—	—	—	—	—	—	—	—
17th	—	—	—	—	—	—	—	—	—	—
18th	—	—	—	—	—	—	—	—	—	—
19th	—	—	—	—	—	—	—	—	—	—
20th	—	—	—	—	—	—	—	—	—	—
21st	—	—	—	—	—	—	—	—	—	—
22nd	—	—	—	—	—	—	—	—	—	—
23rd	—	—	—	—	—	—	—	—	—	—
24th	—	—	—	—	—	—	—	—	—	—
25th	—	—	—	—	—	—	—	—	—	—

## OFFICIAL INJURY DATA — SOFT TISSUE INJURIES

Indicate the Location, Lesion, Detail (size, depth, fracture type, head injury clinical signs and neurological deficits), and Source of all injuries indicated by official sources (or from PAR or other unofficial sources if medical records and interviewee data are unavailable.)



**SOURCE OF INJURY DATA****OFFICIAL**

- (1) Autopsy records with or without hospital medical records
- (2) Hospital medical records other than emergency room (e.g., discharge summary)
- (3) Emergency room records only (including associated X-rays or other lab reports)
- (4) Private physician, walk-in or emergency clinic

**UNOFFICIAL**

- (5) Lay coroner report
- (6) E.M.S. personnel
- (7) Interviewee
- (8) Other source (specify): \_\_\_\_\_
- (9) Police

**INJURY SOURCE****FRONT**

- (01) Windshield
- (02) Mirror
- (03) Sunvisor
- (04) Steering wheel rim
- (05) Steering wheel hub/spoke
- (06) Steering wheel (combination of codes 04 and 05)
- (07) Steering column, transmission selector lever, other attachment
- (08) Add on equipment (e.g., CB, tape deck, air conditioner)
- (09) Left instrument panel and below
- (10) Center instrument panel and below
- (11) Right instrument panel and below
- (12) Glove compartment door
- (13) Knee bolster
- (14) Windshield including one or more of the following: front header, A-pillar, instrument panel, mirror, or steering assembly (driver side only)
- (15) Windshield including one or more of the following: front header, A-pillar, instrument panel, or mirror (passenger side only)
- (16) Other front object (specify): \_\_\_\_\_

**LEFT SIDE**

- (20) Left side interior surface, excluding hardware or armrests
- (21) Left side hardware or armrest
- (22) Left A pillar
- (23) Left B pillar
- (24) Other left pillar (specify): \_\_\_\_\_

- (25) Left side window glass or frame

- (26) Left side window glass including one or more of the following: frame, window sill, A-pillar, B-pillar, or roof side rail.

- (27) Other left side object (specify): \_\_\_\_\_

- (28) Left side window sill

**RIGHT SIDE**

- (30) Right side interior surface, excluding hardware or armrests

- (31) Right side hardware or armrest

- (32) Right A pillar

- (33) Right B pillar

- (34) Other right pillar (specify): \_\_\_\_\_

- (35) Right side window glass or frame

- (36) Right side window glass including one or more of the following: frame, window sill, A pillar, B pillar, or roof side rail.

- (37) Other right side object (specify): \_\_\_\_\_

- (38) Right side window sill

**INTERIOR**

- (40) Seat, back support

- (41) Belt restraint webbing/buckle

- (42) Belt restraint B-pillar attachment point

- (43) Other restraint system component (specify): \_\_\_\_\_

- (44) Head restraint system

- (45) Air bag

- (46) Other occupants (specify): \_\_\_\_\_

- (47) Interior loose objects

- (48) Child safety seat (specify): \_\_\_\_\_

- (49) Other interior object (specify): \_\_\_\_\_

**ROOF**

- (50) Front header

- (51) Rear header

- (52) Roof left side rail

- (53) Roof right side rail

- (54) Roof or convertible top

**FLOOR**

- (56) Floor (including toe pan)

- (57) Floor or console mounted transmission lever, including console

- (58) Parking brake handle

- (59) Foot controls including parking brake

**REAR**

- (60) Backlight (rear window)

- (61) Backlight storage rack, door, etc.
- (62) Other rear object (specify): \_\_\_\_\_

**EXTERIOR of OCCUPANT'S VEHICLE**

- (65) Hood

- (66) Outside hardware (e.g., outside mirror, antenna)

- (67) Other exterior surface or tires (specify): \_\_\_\_\_

- (68) Unknown exterior objects

**EXTERIOR OF OTHER MOTOR VEHICLE**

- (70) Front bumper

- (71) Hood edge

- (72) Other front of vehicle (specify): \_\_\_\_\_

- (73) Hood

- (74) Hood ornament

- (75) Windshield, roof rail, A-pillar

- (76) Side surface

- (77) Side mirrors

- (78) Other side protrusions (specify): \_\_\_\_\_

- (79) Rear surface

- (80) Undercarriage

- (81) Tires and wheels

- (82) Other exterior of other motor vehicle (specify): \_\_\_\_\_

- (83) Unknown exterior of other motor vehicle

**OTHER VEHICLE OR OBJECT IN THE ENVIRONMENT**

- (84) Ground

- (85) Other vehicle or object (specify): \_\_\_\_\_

- (86) Unknown vehicle or object

**NONCONTACT INJURY**

- (90) Fire in vehicle

- (91) Flying glass

- (92) Other noncontact injury source (specify): \_\_\_\_\_

- (93) Air bag exhaust gases

- (97) Injured, unknown source

**INJURY SOURCE CONFIDENCE LEVEL**

- (1) Certain
- (2) Probable
- (3) Possible
- (9) Unknown

**DIRECT/INDIRECT INJURY**

- (1) Direct contact injury
- (2) Indirect contact injury
- (3) Noncontact injury
- (7) Injured, unknown source

**OCCUPANT INJURY CLASSIFICATION****O.I.C. Body Region**

- (M) Abdomen
- (Q) Ankle—foot
- (A) Arm (upper)
- (B) Back-thoracolumbar spine
- (C) Chest
- (E) Elbow
- (F) Face
- (R) Forearm
- (H) Head—skull
- (U) Injured, unknown region
- (K) Knee
- (L) Leg (lower)
- (Y) Lower limb(s) (whole or unknown part)
- (N) Neck—cervical spine
- (P) Pelvic—hip
- (S) Shoulder
- (T) Thigh
- (X) Upper limb(s) (whole or unknown part)
- (O) Whole body
- (W) Wrist—hand

**Aspect of Injury**

- (A) Anterior—front
- (B) Bilateral (rib fracture only)
- (C) Central
- (I) Inferior—lower
- (U) Injured, unknown aspect
- (L) Left
- (P) Posterior—back
- (R) Right
- (S) Superior—upper
- (W) Whole region

**Lesion**

- (A) Abrasion
- (M) Amputation
- (V) Avulsion
- (B) Burn
- (K) Concussion
- (C) Contusion
- (N) Crush
- (G) Detachment, separation
- (D) Dislocation

- (F) Fracture
- (Z) Fracture and dislocation
- (U) Injured, unknown lesion
- (L) Laceration
- (O) Other
- (P) Perforation, puncture
- (R) Rupture
- (S) Sprain
- (T) Strain
- (E) Total severance, transection

**System/Organ**

- (W) All systems in region
- (A) Arteries—veins
- (B) Brain
- (D) Digestive
- (E) Ears
- (O) Eye
- (H) Heart
- (U) Injured, unknown system
- (I) Integumentary
- (J) Joints
- (K) Kidneys

- (L) Liver
- (M) Muscles
- (N) Nervous system
- (P) Pulmonary—lungs
- (R) Respiratory
- (S) Skeletal
- (C) Spinal cord
- (Q) Spleen
- (T) Thyroid, other endocrine gland
- (V) Vertebrae

**Abbreviated Injury Scale**

- (1) Minor injury
- (2) Moderate injury
- (3) Serious injury
- (4) Severe injury
- (5) Critical injury
- (6) Maximum (untreatable)
- (7) Injured, unknown severity

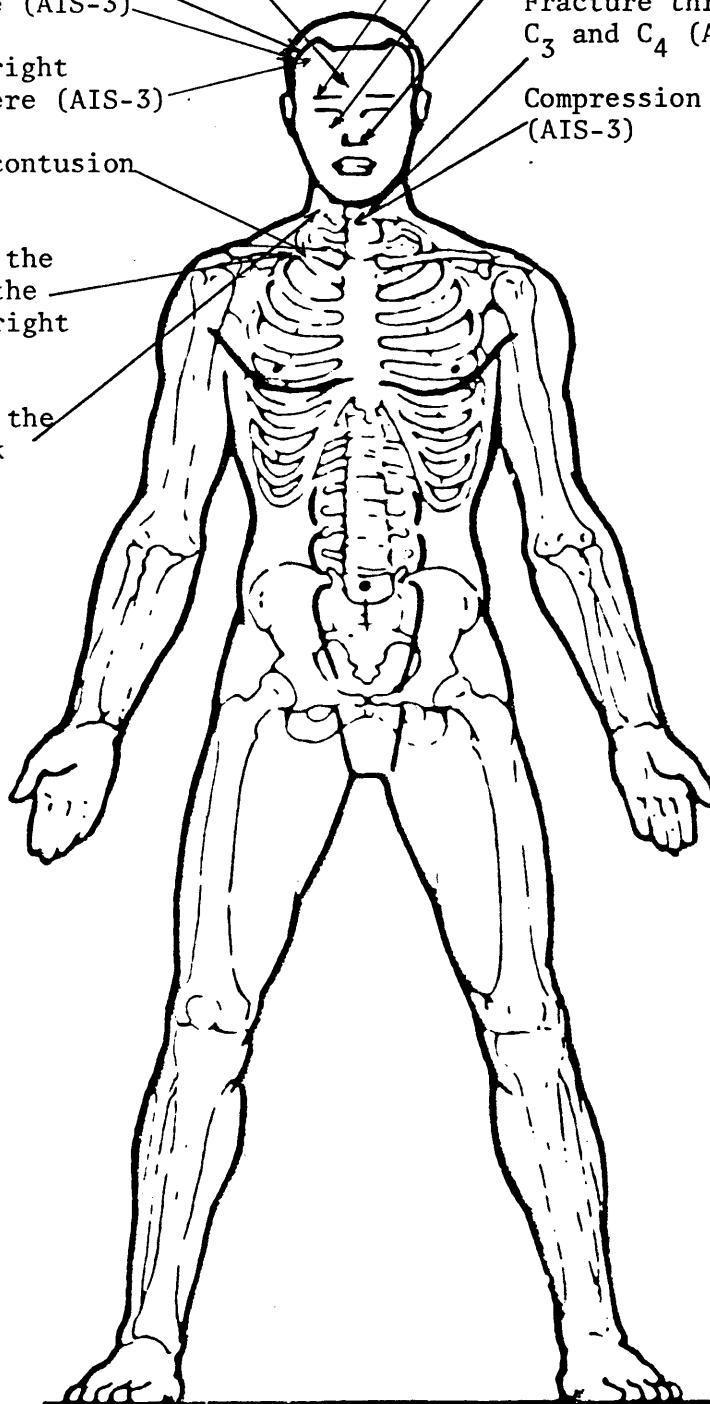
**AGE** 42

**SEX** Female

**WT.** 90-100 lbs

**HT.** 61"

- Fracture of the right orbit (AIS-2)
- Large hinge fracture through the base of the skull (AIS-4)
- Cerebral edema (AIS-4)
- Subdural hemorrhage (AIS-3)
- Contusions of the right cerebellar hemisphere (AIS-3)
- Upper right chest contusion (AIS-1)
- Large contusion of the lateral aspect of the upper lobe of the right lung (AIS-3)
- Large contusion of the right anterior neck (AIS-1)
- Fracture of the right maxillary sinus (AIS-2)
- Fractured nasal bones (AIS-1)
- Fracture through the disc at C<sub>3</sub> and C<sub>4</sub> (AIS-2)
- Compression of the spinal cord (AIS-3)



## **APPENDIX D**

### **DERM Printout**

## SIR DERM EEPROM DATA

Write in DATE: [REDACTED] 12/

Write in VIN: J8LRT [REDACTED]

ROM identification: 85

B600: AA AA 00 00 00 01 00 00  
 B608: 00 00 00 00 00 00 00 00  
 B610: 00 7D 00 00 FF 2F 13 00  
 B618: 09 04 B3 EF 01 00 00 00  
 B620: 00 00 00 00 00 00 00 00  
 B628: 00 00 00 00 00 00 00 00  
 B630: 00 00 00 00 00 00 00 00  
 B638: 00 00 00 00 00 00 00 00  
 B640: 00 00 00 00 00 00 00 00  
 B648: 00 00 00 00 00 00 00 00  
 B650: 00 00 00 00 00 00 00 00  
 B658: 00 00 00 00 00 00 00 00  
 B660: 00 00 00 00 00 00 22 00  
 B668: 00 FF 04 F9 F9 F9 9C  
 B670: 00 00 00 00 00 00 00 00  
 B678: 00 00 00 00 00 00 00 00  
 B680: 00 00 00 00 00 00 00 00  
 B688: 00 00 00 00 00 00 00 55  
 B690: 00 00 00 00 00 00 00 00  
 B698: 00 00 00 00 00 00 00 00  
 B6A0: 00 00 00 00 00 00 00 00  
 B6A8: 00 00 00 00 00 00 00 00  
 B6B0: 00 29 7D 00 00 00 00 00  
 B6B8: 00 03 7D 00 00 00 00 00  
 B6C0: 00 59 7D 00 00 70 00 00  
 B6C8: 70 00 01 00 00 00 00 00  
 B6D0: 00 29 7D 00 00 00 00 00  
 B6D8: 00 01 7D 00 00 00 00 00  
 B6E0: 00 28 7D 00 00 00 00 00  
 B6E8: 00 CF 7D 00 00 00 00 00  
 B6F0: 00 04 7D 00 00 00 00 00  
 B6F8: 00 00 7D 00 00 00 00 00  
 B700: 00 F7 7D 00 00 00 00 00  
 B708: 00 1E 7D 00 00 00 00 00  
 B710: 00 A8 7D 00 00 00 00 00  
 B718: 00 2D 7D 00 00 00 00 00  
 B720: 00 A8 7D 00 00 00 00 00  
 B728: 00 F5 7D 00 00 00 00 00  
 B730: 00 0F 7D 00 00 00 00 00  
 B738: 00 70 7D 00 00 00 00 00  
 B740: 00 97 7D 00 00 00 00 00  
 B748: 00 E0 7D 00 00 00 00 00  
 B750: 00 28 7D 00 00 00 00 00  
 B758: 00 38 7D 00 00 00 00 00  
 B760: 00 94 7D 00 00 00 00 00  
 B768: 00 0E 7D 00 00 00 00 00  
 B770: 00 56 7D 00 00 00 00 00  
 B778: 00 95 7D 00 00 00 00 00  
 B780: 00 01 7D 00 00 00 00 00  
 B788: 00 01 7D 00 00 00 00 00  
 B790: 00 38 7D 00 00 00 00 00  
 B798: 00 05 7D 00 00 00 00 00  
 B7A0: 00 15 7D 00 00 00 00 00  
 B7A8: 00 78 7D 00 00 00 00 00  
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 B7C8: 00 00 00 00 00 00 00 00  
 B7D0: 00 00 00 00 00 00 00 00  
 B7D8: 00 00 00 00 00 00 00 00  
 B7E0: 00 00 00 00 00 00 00 00  
 B7E8: 00 00 00 00 00 00 00 00  
 B7F0: 00 00 00 00 00 00 00 00  
 B7F8: 00 00 00 00 00 00 00 00

CHEVROLET



Geo

THIS IS TO CERTIFY that this is a true  
and exact copy of the original tape as  
presented to me for duplication on this  
day of [REDACTED] 1991.

Master [REDACTED]

Info. from [REDACTED]

Serv. No. [REDACTED]



## SELECTED PRINTS



Pre-Crash Trajectory of the Geo Storm GSi



Pavement Depression





Barrier Curb Struck by Right Rear Tire and Wheel



CCW Rotational Trajectory of Vehicle Across Roadway





Struck Guardrail



Longitudinal View Showing Deflection to W-Beam Guardrail





Post-Crash Trajectory of Vehicle



Final Rest Position of the Vehicle



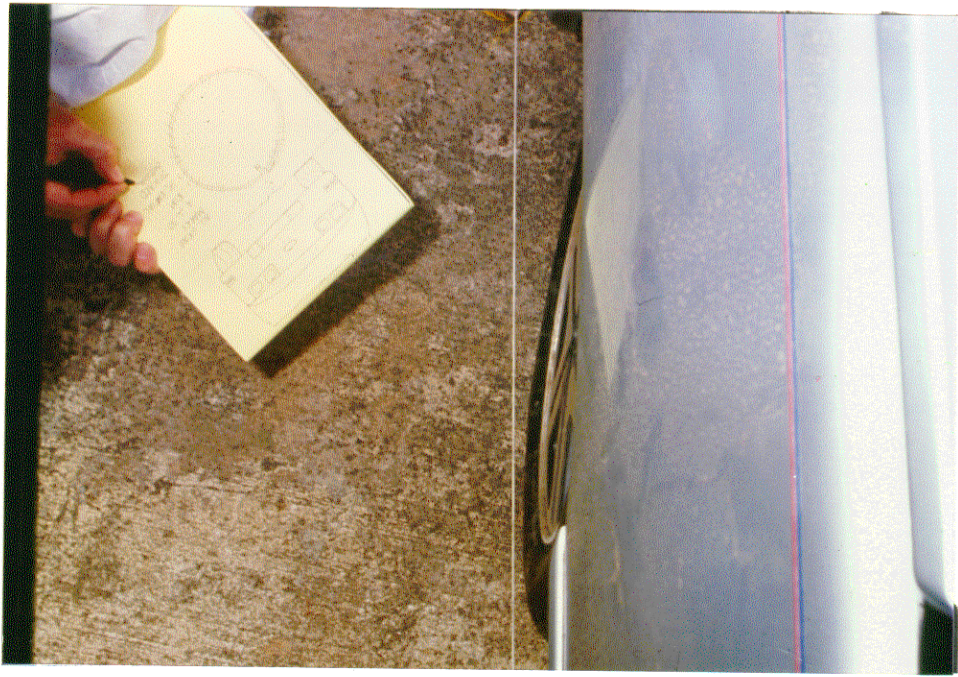


Frontal View of the Geo Storm

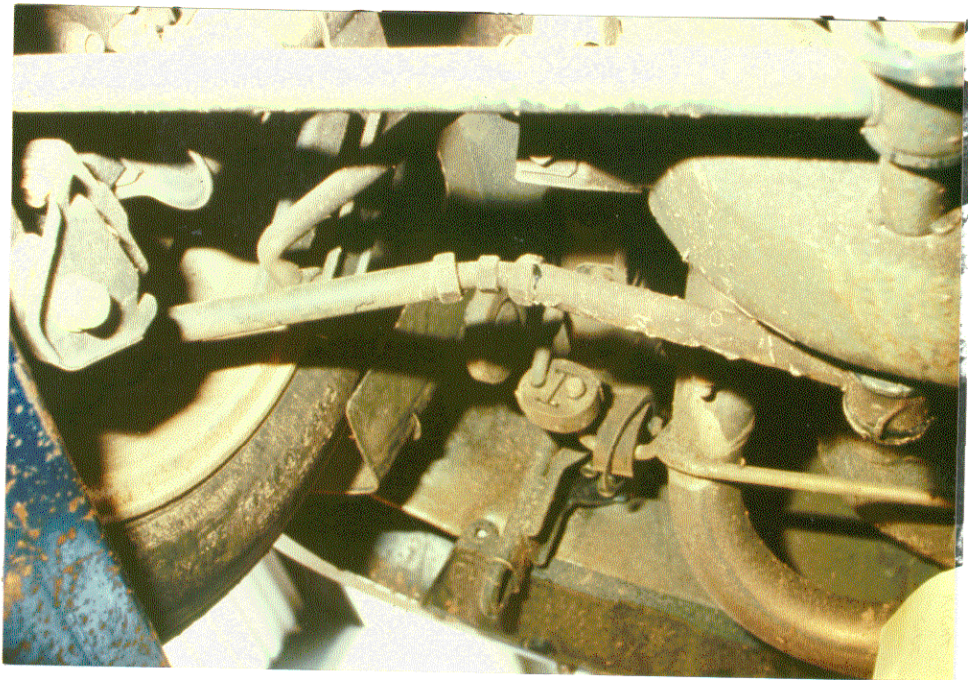


Perpendicular View Showing the Extent of Crush





Toe Out of Left Rear Tire and Wheel



Toe Out Adjustment Rod Displacement





Overall Interior View



Deployed Driver Air Bag





Make-up Transfers on the Peripheral Surface of the Bag

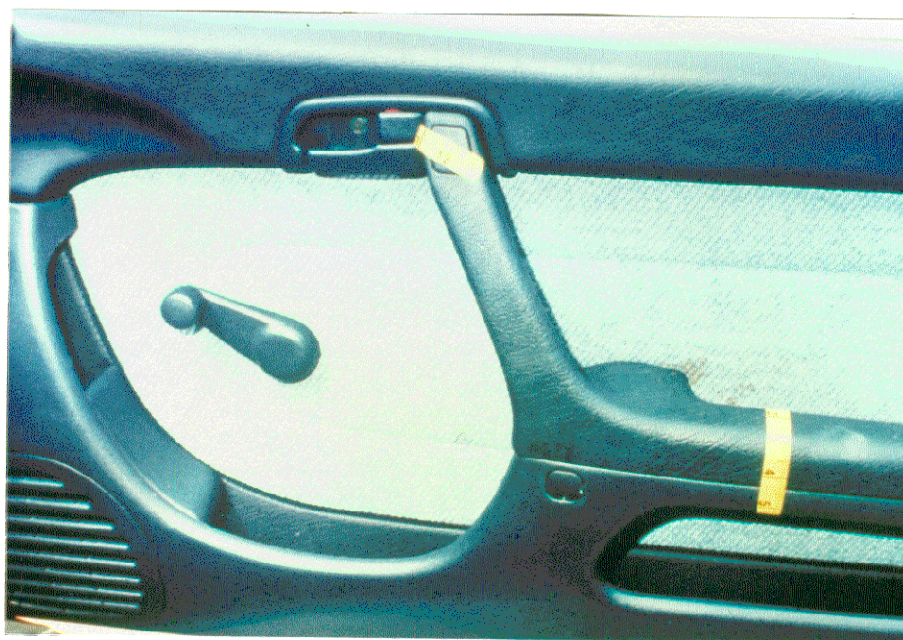


Perpendicular View of the Air Bag Module Cover Flaps



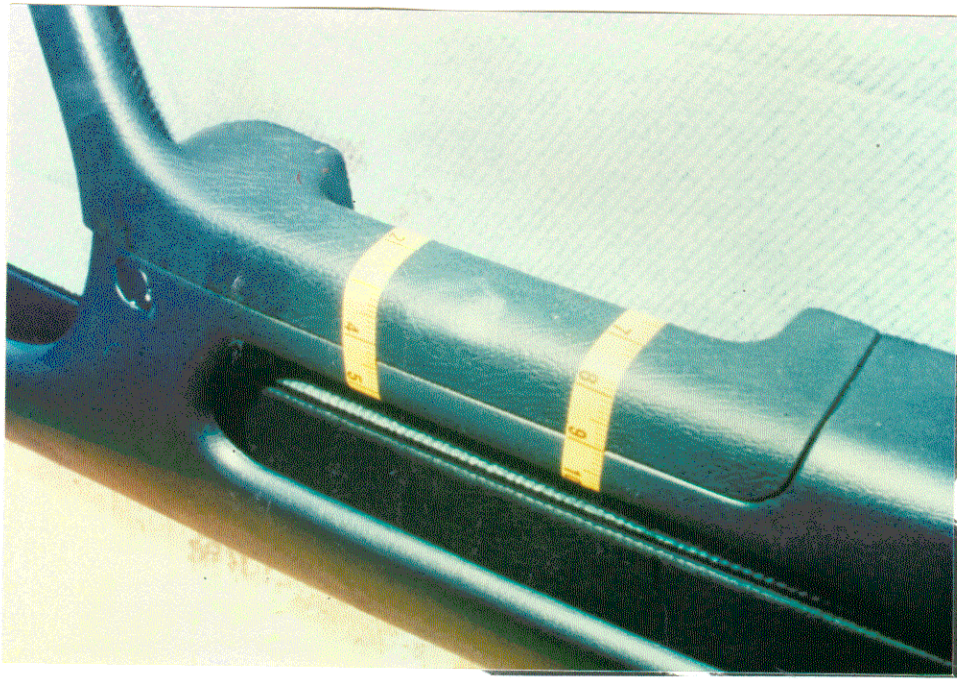


Trajectory of Driver Toward Right Front Door



Facial Contact to the Right Door Pull Handle





Probable Tissue Transfer on Right Door Armrest



Final Rest Position of Driver's Head





Perpendicular View of Driver's Seat Position



Simulation of Driver Position



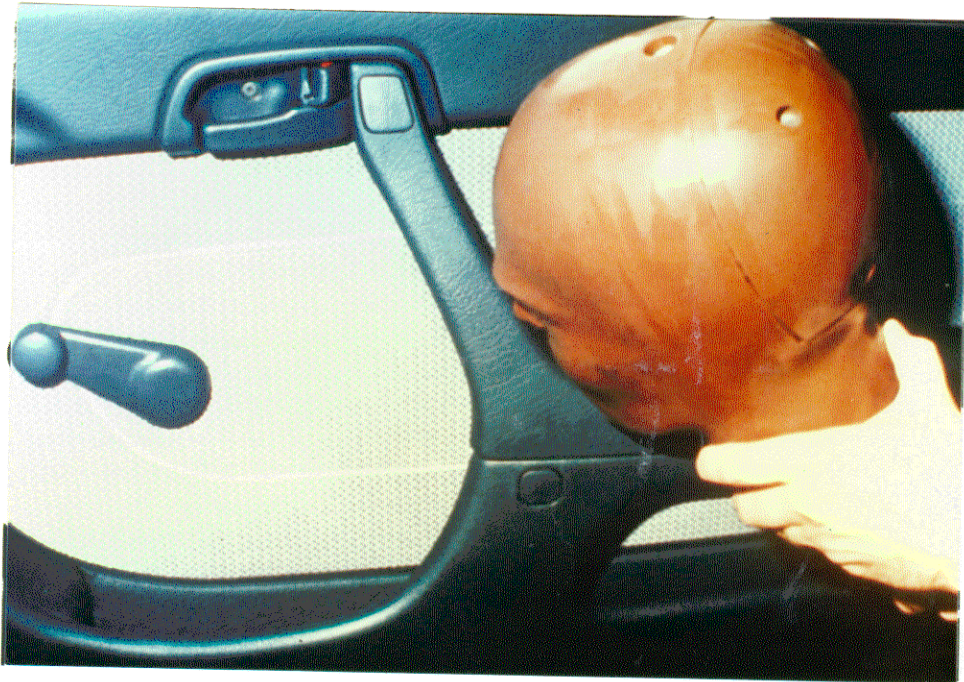


Facial Contact With Deployed Air Bag



Simulation of Facial/Head Impact to the Right Door Pull Handle





Hybrid III Head Form Simulated Contact With Right Door Pull Handle







